

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 2.]

[1911.

V.—A DISEASE OF THE LILAC.

(*Helminthosporium syringae*, Klebahn.)

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The comparatively sudden appearance of epidemics due to fungi, although of frequent occurrence, is but little understood, and in most instances no explanation whatever can be offered as to the cause of such appearance. Among epidemics of recent occurrence in this country may be mentioned "Corky Scab" of the potato caused by *Spongospora scabies*, Mass. This fungus, described by Berkeley, more than half a century ago, as occurring on potatoes, was not seen again by any mycologist for many years, until it suddenly reappeared in the form of a serious epidemic of potatoes in this country and in Ireland, some few years ago.

As another example may be cited the common *Euonymus japonicus*, L., an evergreen shrub that has been in cultivation in this country for many years. Until about 10 years ago it had been remarkably free from diseases caused by fungi, when suddenly and almost simultaneously, along the south coast, where the shrub is largely cultivated, it was attacked by a white mildew to such an extent that the bushes often presented the appearance of having been whitewashed. The mildew, *Oidium Euonymi-japonici*, Sacc., appears to flourish best in the vicinity of the sea, as up to the present it has failed to establish itself inland. The American Gooseberry Mildew, *Sphaerotheca mors-uvae*, Schw.; Black scab of potatoes, *Synchytrium endobioticum*, Percival; Celery leaf-blight, etc., also belong to this category.

Some of these diseases which have been considered as of comparatively recent occurrence, may have been known to gardeners and farmers for many years, but only during quite recent times has their true nature been understood by people generally.

Lilac bushes are the latest of victims to an epidemic caused by the fungus *Helminthosporium syringae*, Klebahn. The leaves are the part attacked and show the earliest indication of injury in a brownish stain running down each half of the leaf, at some distance from the midrib; this stain gradually spreads but appears never to extend to the edge of the leaf; the stained area becomes darker in colour,

and studded with olive-black patches of the fruit of the fungus. At a later stage the diseased portion of the leaf becomes brown and dry and frequently more or less cracked or torn. Spores are produced in great abundance on diseased leaves and these are washed by rain or carried by insects, birds, etc., to other parts of the bush, resulting in the infection of practically every leaf, which, apart from the disfiguration of the bush early in the season, prevents the ripening of the wood, and generally tends to weaken the plant.

Healthy lilac leaves infected with the spores of the fungus showed the characteristic browning at the end of four days, and spores were produced in abundance on the seventh day.

Foliage sprayed with a solution of potassium sulphide (liver of sulphur) resisted infection. If bushes were sprayed with a solution of this substance half an ounce in a gallon of water, the disease could probably be held in check, provided spraying was commenced during the early stage of the disease. Diseased fallen leaves should be collected and either buried or burned.

VI.—DIAGNOSES AFRICANAE: XXXIX.

1181. *Mesembryanthemum rubrolineatum*, *N. E. Brown* [Ficoideae]; affine *M. aloidi*, Haw., sed foliis et floribus majoribus et petalis rubrolineatis facile distinguitur.

Planta succulenta, caespitosi-ramosa. *Caulis* subnullus vel aetate irregulariter subtuberiformis, irregulariter ramosus, carnosus, 1.5–2.5 cm. crassus. *Folia* 8–12 in rosulam conferta, decussata, valde patentia, libera, 2.3–5 cm. longa, 0.9–2.2 cm. lata, 5–9 mm. crassa, submolliter carnosae, trigono-oblonga vel trigono-spathulata et ultra medium subrhomboideo-dilatata, acuta, supra plana, subtus basi convexa, superne carinata sed haud gibbosa, angulis integris, glabra, sordide viridia, maculis parvis albis leviter prominulis crebre notata, interdum purpureo-tincta. *Flores* solitarii vel bini, axillares, 4 cm. diametro. *Pedunculus* 1 cm. longus, 4 mm. crassus, glaber. *Sepala* 5, subaequalia, 1 cm. longa, 8–11 mm. lata, plana, deltoideo-ovata, obtuse acuta, glabra, sordide viridia, crebre albomaculata. *Petala* numerosa, biseriata, imbricata nec laxa, 1.4–1.5 cm. longa, 2.5–3 mm. lata, lineari-lanceolata, acuta, lutea medio utrinque linea rubra notata. *Stamina* numerosa, in conum latum collecta, lutea. *Stigmata* 10, subulata, pallide viridia.

SOUTH AFRICA. Described from a living plant sent to the Royal Botanic Gardens, Kew, from the Botanic Garden at Graaff Reinet, Cape Colony, in 1908.

The flowers commence to open at about 11 o'clock in the morning, and begin to close at 4 o'clock in the afternoon, apparently irrespective of direct sunlight. It is closely allied to *M. aloides*, Haw., and *M. nobile*, Haw., but very distinct from both in its flowers. The leaves resemble those of the former species, but are much larger.

1182. *Protea Doddii*, *Phillips* [Proteaceae-Proteeae]; verisimiliter *P. lanceolatae*, E. Mey., affinis, stylis et forma capituli differt.

Frutex 15–20 cm. altus. *Rami* glabri. *Folia* 4.5–5.8 cm. longa, 4.5–5 mm. lata, linearia, apice obtusa, basi angustata, indistincte

nervosa ; costa immersa, glabra. *Capitulum* sessile, 5 cm. longum, circiter 3·8 cm. latum. *Involucri bracteae* 12-seriatae ; exteriores ovatae, apice acutae vel subacutae, glabrae vel minute pubescentes, aliquando inferne ciliatae ; interiores oblongae, apice obtusae, concavae, glabrae, calycibus subaequales. *Receptaculum* paullo convexum ; paleae ovatae, apice acutae. *Calycis tubus* 2·4 cm. longus, basi dilatatus, tricarinatus et 7-nervis, glaber ; laminae 9 mm. longae, tricarinatae, glabrae ; laminae connexae apice 3-dentatae ; dentes aequales, 1·3 mm. longi. *Stamina* sessilia, 6 mm. longa ; antherae lineares, apice glandulis 0·3 mm. longis ovatis obtusis instructae. *Ovarium* 2 mm. longum, obovato-ellipticum, pilis longis vestitum ; stylus 3·2 cm. longus, linearis, unisulcatus, basi tumidus et 5-carinatus ; stigma 6 mm. longum, cylindricum, apice obtusum, basi sinuatum.

SOUTH AFRICA. East London Div. : between Gonubie and Quinera River, *Dodd in Herb. Galpin*, 7936.

Mr. Galpin writes that "the plant was found by . . . , Messrs. B. H. Dodd and John Wood, growing in open grass between the Gonubie and Quinera Rivers, about $1\frac{1}{2}$ miles from the sea It was only found in one small area where it is fairly abundant. None of the plants are more than 12-14 in. high. Mr. Wood has been exploring in the East London Division for the last 15 years and neither he, Mr. Dodd nor I had ever come across this plant before, so that apparently—so far as the East London District is concerned—it is restricted to this one spot and very rare."

1183. *Protea Harmeri*, *Phillips* [Proteaceae-Proteaceae] ; verisimiliter *P. scolymocephalae*, Reichard, et *P. cedromontanae*, Schltr., affinis, ab illa foliis obtusis et ramis superne tomentosis, ab hac foliis brevioribus et calycis tubo superne angustiore differt.

Frutex circiter 1 m. altus ? *Rami* superne tomentosi, demum glabri. *Folia* 5-6 cm. longa, 3-3·5 mm. lata, linearia, apice obtusa, basi attenuata, subtus concava, glabra ; juniora basi tomentosa. *Capitulum* sessile, 2·5 cm. longum, circiter 2·5-3 cm. latum, globosum ; receptaculum convexum. *Involucri bracteae* 10-11-seriatae ; exteriores ovatae, apice obtusae, glabrae vel superne glabrae et inferne pubescentes ciliatae, marginibus membranaceis ; interiores oblongo-spathulatae, superne recurvae, glabrae vel minute pubescentes, stylis breviores. *Calycis tubus* 1·5 cm. longus, superne 0·75 mm. latus, basi dilatatus, 3-nervis, glaber vel superne hirsutus ; laminae 4 mm. longae, grosse pilosae, demum supra glabrae ; laminae connexae apice tridentatae ; dentes subaequales, 0·33 mm. longi, medius brevior. *Stamina* omnia fertilia, subsessilia, 3·5 mm. longa ; antherae lineares, apice glandulis 0·33 mm. longis ovatis obtusis instructae. *Squamae hypogynae* 1 mm. longae, 0·33-0·5 mm. latae, oblongae, obtusae. *Ovarium* 2 mm. longum, oblongo-obovatum, pilis longis rufis vestitum ; stylus 2·1 cm. longus, superne teres, unisulcatus, inferne planus, cavus, glaber ; stigma 2·75 mm. longum, lineare, obtusum, sulcatum, in stylum sensim angustatum.

SOUTH AFRICA. Worcester Div. : hill near Matjesfontein, *Harmer*, August 10th, 1905.

Named after Dr. S. F. Harmer, F.R.S., Keeper of the Zoological Department of the Natural History Museum, who collected this *Protea* during the visit of the British Association to S. Africa in 1905.

Dr. Harmer reports: "I think it was a low bush, not more than three feet high. To the best of my recollection the bracts of the involucre . . . were of a decided brick-red colour. The 'flower' struck me as being quite different from that of any other *Protea* I had seen; and I saw nothing like it afterwards.

1184. *Protea transvaalensis*, Phillips [Proteaceae - Proteeae]; affinis *P. Mundii*, Klotzsch, a qua capitulo glabro differt.

Rami glabri. *Cortex* niger, superne cinereus. *Folia* 3·8-10·2 cm. longa, 2-3·2 cm. lata, lanceolata vel obovato-lanceolata, apice obtusa, basi angustata, distincte pinnato-venosa, glabra, marginibus membranaceis. *Capitula* (immatura) sessilia, 4·5-5 cm. longa, circiter 2·5 cm. lata, oblonga; receptaculum paullo convexum. *Involucri bracteae* 10-seriatae; exteriores ovatae, subacutae vel subobtusae, inferne minute pubescentes, vel glabrae, aliquando pilis paucis ciliatae; interiores oblongae, apice obtusae, concavae, glabrae vel superne minute pubescentes, aliquando pilis paucis ciliatae. *Calycis tubus* 1·5 cm. longus, basi dilatatus, 9-nervis, glaber; laminae 1·5 cm. longae, majores apice dentatae, glabrae, minores grosse pilosae; dentes laterales 1·75 mm. longi, oblongi, hirsuti, apice ciliati; dens medius 1 mm. longus, angustior. *Stamina* subsessilia, 1 cm. longa; filamenta concava; antherae lineares apice glandulis 0·33 mm. longis ovatis tumidis instructae. *Squamae hypogynae* 0·4 mm. longae, 0·33 mm. latae, oblongae, apice obtusae. *Ovarium* 2 mm. longum, oblongum, pilis longis vestitum; stylus 1·5 cm. longus, linearis, glaber; stigma 1 cm. longum, filiforme, sulcatum, apice obtusum et minute compressum, basi paullo sinuatum.

SOUTH AFRICA. Transvaal: Goedgeluk, Zoutpansberg, Burt-Davy, 5179.

This is a very distinct species unlike any other which I have seen. In the colour of the bark and shape of the leaves it approaches *P. Mundii*, Klotzsch, but differs from this species by the glabrous or slightly pubescent not woolly involucre-scales.

1185. *Mimetes saxatilis*, Phillips [Proteaceae-Proteeae]; species distincta, ex affinitate *M. palustris*, Knight, sed stigmatibus obtusis et bracteis coriaceis differt.

Rami tomentosi vel breviter villosi. *Folia* 3-4 cm. longa, 1·8-3·2 cm. lata, elliptica, obovata vel suborbicularia, obtusa, apice integra vel tridentata, dentibus obtusis, basi subcordata, indistincte 5-6-nervia, dense pubescentia, albo-ciliata. *Capitula* axillaria, sessilia, 2 cm. longa, 10-12-flora, apice ramorum conferta. *Involucri bracteae* 5-6-seriatae, oblongae, lanceolatae, vel ovatae, subacuminatae, acutae, coriaceae, rugosae, aliquid pubescentes, ciliatae. *Calycis tubus* 2 mm. longus, glaber, superne ciliatus; lobi 2·5 cm. longi, lineari-spathulati, dense pilosi parte apicali dilatata 3 mm. longa oblongo-lineari subacuta glabra excepta. *Stamina* sessilia, 4 mm. longa; filamenta oblonga, tumida, sulcata; antherae 2 mm.

longae, lineares, apice glandulis 0·5 mm. longis lanceolatis acutis concavis instructae. *Squamae hypogynae* 2 mm. longae, lineares. *Ovarium* 1 mm. longum, pubescens; stylus 3·5 cm. longus, cylindricus, basi paullo applanatus, glaber; stigma 3 mm. longum, cylindricum, apice globosum, obtusum, basi nodulosum.

SOUTH AFRICA. Bredasdorp Div.: Eluie, *Schlechter*, 7716; Mier Kraal, *Schlechter*, 10,521.

1186. *Sorocephalus longifolius*, *Phillips* [Proteaceae-Proteeae]; *S. imberbi*, R. Br., affinis, foliis brevioribus et ramis asperis differt.

Rami superne pilosi, demum inferne pubescentes. *Folia* 2·5–5·1 cm. longa, cylindrico-filiformia, apice acuta, mucronata, supra sulcata, infra convexa, basi plana, glabra. *Capitula* 7–9-flora, in racemis terminalibus 1·8–2·4 cm. longis 1·4–2·4 cm. latis. *Bracteae* 1·2 cm. longae, lanceolato-oblongae, acuminatae, apice acutae, inferne sparse pilosae et ciliatae. *Pedunculus* 2–4 mm. longus, villosus. *Involucri bracteae* 7–7·5 mm. longae, ovato-lanceolatae, acuminatae vel subacuminatae, apice subacutae, pilosae, dense ciliatae. *Calycis tubus* 1·8–2 mm. longus, cylindricus, basi ventricosus, superne pubescens, inferne glaber; lobi 7·5 mm. longi, spathulato-lineares, villosi, spiraliter contorti, parte apicali dilatata 1·5 mm. longa ovata obtusa ebarbigera glabra. *Stamina* sessilia, 0·75–1 mm. longa; antherae ellipticae vel oblongae, apice glandulis minutis instructae. *Squamae hypogynae* 0·66 mm. longae, lineares, apice obtusae. *Stylus* 8 mm. longus, teres, e basi ad apicem sensim angustatus, supra ovarium constrictus; stigma 0·33 mm. longum, ovatum vel ellipticum, breviter rostratum, paullo pubescens vel glabrum. *Fructus* subsessilis, 6 mm. longus, oblongus, apice obtusus.—*S. imberbis* var. *longifolius*, Meisn. in DC. Prodr. vol. xiv. p. 303.

SOUTH AFRICA. Swellendam Div.: banks of Zonde Einde River, near Apple's Kraal, *Zeyher*, 3718.

1187. *Sorocephalus Schlechteri*, *Phillips* [Proteaceae-Proteeae]; *S. salsoloidi*, R. Br., affinis, foliis brevioribus differt.

Rami glabri. *Folia* 0·6–1 cm. longa, linearia, apice obtusa, obtuse apiculata, paullo apice incurva, infra convexa, supra plana vel convexa, minute punctata, glabra. *Capitula* 4-flora, in racemis terminalibus 0·8–1 cm. longis circiter 1·2 cm. latis. *Bracteae* 5 mm. longae, 2 mm. latae, ovatae, apice acutae, aliquando bifidae, basi attenuatae, 14–16-nerviae, pilosae, ciliatae. *Pedunculus* 2 mm. longus. *Involucri bracteae* 4–4·5 mm. longae, ovatae, apice acutae, circiter 5-nerviae, pilosae, dense ciliatae. *Calycis tubus* 2·5 mm. longus, cylindricus, basi ventricosus, glaber vel minute pubescens; lobi 4–5 mm. longi, spathulato-lineares, inferne glabri, superne aliquando pilosi vel villosi, parte apicali dilatata 1 mm. longa elliptica subacuta glabra vel pilosa barbigera. *Stamina* 0·75–1 mm. longa; antherae ellipticae. *Ovarium* 0·5–0·6 mm. longum, ovatum, rostratum, villosum; stylus 5·5–6 mm. longus, teres, filiformis, supra ovarium articulatus, glaber; stigma 0·4 mm. longum, ellipticum, apice subacutum.

SOUTH AFRICA. Ceres Div.: Gydouwberg, *Schlechter*, 10,230.

1188. *Sorocephalus teretifolius*, *Phillips* [Proteaceae-Proteeae]; verisimiliter *S. spatuloidi*, R. Br., affinis, foliis levibus non asperis differt.

Rami minute tomentosi. *Folia* 1-1.4 cm. longa, cylindrica, obtuse apiculata, supra unisulcata, juniora dense pilosa, demum glabra. *Capitula* in spicis subsessilibus terminalibus 1 cm. longis circiter 1.2 cm. latis. *Involucri bracteae* 6-8 mm. longae, lanceolatae, apice acutae, concavae, pilosae, dense ciliatae. *Calycis tubus* 2-2.5 mm. longus, superne pilosus, inferne glaber; lobi 6.5 mm. longi, spathulato-lineares, paullo villosi, spiraliter contorti, parte apicali dilatata 1.3 mm. longa ovata vel elliptico-ovata subobtusa pilosa vel villosa barbigerà. *Stamina* 0.6 mm. longa; antherae oblongo-lineares. *Ovarium* 1-1.5 mm. longum, ellipticum, rostratum, pilosum; stylus 7.5 mm. longus, teres, apice angustatus, supra ovarium constrictus, glaber; stigma 0.3-0.5 mm. longum, ellipticum vel ovatum, apice obtusum. *S. lanatus*, R. Br., var *teretifolius*, Meisn. in DC. Prodr. vol. xiv. p. 305.

SOUTH AFRICA. Worcester Div.: Dutoit's Kloof, Drège.

1189. *Sorocephalus rupestris*, Phillips [Proteaceae-Proteeae]; *S. teretifolio*, Phillips, affinis, bracteis villosis et fructibus brevioribus differt.

Rami cicatricosi, villosi, demum glabri. *Folia* 0.8-1.4 cm. longa, cylindrica, apice subacuta, apiculata, supra sulcata, basi plana, glabra. *Capitula* uniflora, in spicis terminalibus solitariis densis 0.8-1.2 cm. longis circiter 8 mm. latis. *Bracteae* 3.5 mm. longae, lanceolatae, apice subacutae, glabrae. *Involucri bracteae* 4-5 mm. longae, lanceolatae, subacuminatae, apice subacutae, dense villosae. *Calycis tubus* 2 mm. longus, cylindricus, glaber; lobi 7.8-8 mm. longi, spathulato-lineares, villosi, parte apicali dilatata 1 mm. longa ovata obtusa dense villosa breviter barbigerà. *Stamina* sessilia, 1 mm. longa; antherae ellipticae vel elliptico-ovatae. *Ovarium* 1 mm. longum, ellipticum, pubescens, breviter rostratum; stylus 6-9.5 mm. longus, teres, e basi ad apicem sensim angustatus, supra ovarium constrictus; stigma 0.33 mm. longum, ovato-conicum, apice subacutum. *Fructus* 3 mm. longus, ovatus, apice obtusus.—*Sorranthe montana*, Knight, Prot. p. 73; *S. rupestris*, Knight, l.c.

SOUTH AFRICA. Caledon Div.: mouth of the Klein River, Niven; Stellenbosch Div.: tops of Stellenbosch Mts., Niven, 28.

The parts of the flower in the Klein River specimen are larger than in Niven 28, but the material is too scanty to keep them specifically distinct as Knight did, especially as the two agree in vegetative characters.

1190. *Sorocephalus tulbaghensis*, Phillips [Proteaceae-Proteeae]; *S. phyllicoidi*, Meisn., affinis, foliis levibus non asperis differt.

Frutex parvus, 23 cm. altus. *Rami* pilosi, demum glabri. *Folia* 0.6-1.2 cm. longa, linearia, obtuse mucronata, supra concava, infra convexa, sparse pilosa. *Capitula* 4-flora, in racemis terminalibus solitariis vel geminatis 1.2-1.8 cm. longis circiter 1.2 cm. latis. *Bracteae* 3.5-5.5 mm. longae, 1-1.5 mm. latae, ovatae, vel lineari-lanceolatae, apice subacutae, 4-7-nerviae, pilosae, ciliatae. *Pedunculus* 2 mm. longus, pilosus. *Involucri bracteae* 3-3.5 mm. longae, 1.5 mm. latae, ovatae, apice acutae vel subobtusae, 7-9-nerviae, pilosae, longe ciliatae. *Calycis tubus* 2 mm. longus, cylindricus, pubescens vel glaber; lobi 4.5 mm. longi, spathulato-lineares,

villosi, parte apicali dilatata 1·33 mm. longa elliptica vel ovata subobtusata villosa longe barbigeri. *Stamina* 1 mm. longa: antherae ellipticae, apice glandulis minutis lanceolatis instructae. *Squamae hypogynae* 2 mm. longae, lineares, acuminatae. *Ovarium* 0·6–1·5 mm. longum, ovoideum, villosum, apice rostratum; stylus 4·5–5 mm. longus, teres, supra ovarium articulatus; stigma 0·33 mm. longum, conicum, apice obtusum.

SOUTH AFRICA. Tulbagh Div.: Tulbagh, *Pappe*.

1191. *Loranthus* (*Sycophila*) *Wildemanii*, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 273, anglice [*Loranthaceae-Euloranthaeae*]; affinis *L. combretoidi*, Engl., a quo foliis pro rata angustioribus, petalis subduplo longioribus recedit.

Ramuli juniores purpureo-brunnei, subtiliter dense lenticellati, glabri. *Folia* opposita, oblanceolato-oblonga, apice obtuse acuminata, obtusa vel rotundata, basi subcuneata, 6·5–9·5 cm. longa, 2–2·7 cm. lata, chartacea vel tenuiter coriacea, glabra, opaca, nervis utrinque sat prominentibus; petioli 6–7 mm. longi. *Racemi* foliis breviores vel longiores, 5–11·5 cm. longi: bractea late ovata, obtusa, 0·8 mm. longa. *Torus* 3 mm. longus. *Calyx* patens. *Corolla* in alabastro gracillima, inferne anguste quadrialata, alis apice subtruncatis; petala 2 cm. longa, parte inferiore anguste oblonga 4 mm. longa 1–1·3 mm. lata extus costata intus minute papillata, parte superiore subulato-lineari 15 mm. longa reflexa. *Stamina* 1·5 cm. longa; filamenta 5 mm. longa, fere glabra; antherae 9 mm. longae, connectivo ultra thecas 0·8 mm. producto, locellis circiter 27 in utraque serie. *Stylus* 7 mm. longus.

TROPICAL AFRICA. Congo State: Sanda District; near Oddu, *Gillet*, 3585.

1192. *Loranthus* (*Sycophila*) *sublilacinus*, *Sprague*, in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 275, anglice [*Loranthaceae-Euloranthaeae*]; affinis *L. Mannii*, Oliv., a quo foliis chartaceis vel tenuiter coriaceis, nervis lateralibus utrinque prominulis, petalis minoribus recedit.

Ramuli juniores purpureo-brunnei, plus minusve lenticellati, glabri, circiter 2 mm. diametro 30 cm. infra apicem. *Folia* opposita, anguste lanceolato-, oblanceolato- vel elliptico-oblonga, apice obtusa vel rotundata, basi obtusa vel anguste cuneata, 4–7·5 cm. longa, 7–25 mm. lata, chartacea vel tenuiter coriacea, glabra, opaca, nervo medio sat prominente praesertim in facie inferiore, nervis lateralibus utrinque prominulis; petioli 6–8 mm. longi. *Racemi* foliis breviores vel subaequales, circiter 7 cm. longi; pedicelli circiter 1·5 mm. longi; bractea late ovata, plus minusve truncata, circiter 1 mm. longa. *Torus* 3 mm. longus. *Calyx* erectus. *Corolla* in alabastro crassiuscula, inferne acute quadrangularis; petala pallide lilacina, 6·5 mm. longa, parte inferiore oblonga 2 mm. longa 1·3 mm. lata haud manifeste costata intus minute papillata, parte superiore lineari-subulata 4·5 mm. longa. *Stamina* circiter 3·3 mm. longa; filamenta 1 mm. longa, intus minutissime papillata; antherae 2·3 mm. longae. *Stylus* 4·5 mm. longus.—*L. rosaceus*, Engl. in Engl. Jahrb. vol. xl. p. 521, quoad *Staudt*, 757.

TROPICAL AFRICA. Cameroons: Johann-Albrechtshöhe, *Staudt*, 757; Bipinde, *Zenker*, 2518.

1193. *Loranthus* (*Acrostachys*) *Thomsonii*, *Sprague*, in *Dyer*, Fl. Trop. Afr. vol. vi. sect. 1, p. 276, anglice [*Loranthaceae-Euloranthaceae*]; species racemis secundifloris insignis.

Folia sessilia, spatulata, 5 mm. longa, 1·5 mm. lata, coriacea, glabra, circa basin pedunculi fasciculata. *Racemi* 3–5 cm. longi, secundiflori, circiter 20-flori; pedunculus 1–1·2 cm. longus; pedicelli 0·5–0·8 mm. longi; bractea valde concava, ovata, obtusa, 1 mm. longa, ciliata. *Torus* campanulatus, 1·3–1·5 mm. longus. *Calyx* truncatus, vix 0·2 mm. longus. *Corolla* in alabastro linearis, obtusa, quadrangularis, superne leviter ampliata; petala linearia, circiter 2·3 cm. longa, juxta medium torta, inter basin et insertionem staminum 1 mm. lata, haud plicata, medio 0·5 mm. lata, superne 0·8 mm. lata. *Stamina* 2–2·5 mm. supra basin petalorum inserta, circiter 1·8 cm. longa; filamenta inferne 0·5 mm. incrassata et adnata; antherae lineares, 2·5 mm. longae. *Discus* vix 0·3 mm. longus. *Stylus* fere 2·5 cm. longus; stigma ellipsoideum, 0·3–0·5 mm. longum.

TROPICAL AFRICA. Somaliland: Haudh, on *Balsamodendron* sp., *Thomson*, 23.

1194. *Loranthus* (*Plicopetalus*) *sagittifolius*, *Sprague*, in *Dyer*, Fl. Trop. Afr. vol. vi. sect. 1, p. 278, anglice [*Loranthaceae-Euloranthaceae*]; affinis *L. undulato*, E. Mey., a quo umbellis 3–5-floris, toro brevior, stylo inferne recto recedit.

Ramuli patentes, graciles, lenticellati, glabri. *Folia* opposita, sessilia, alia elliptica, obovato-elliptica vel elliptico-oblonga, apice rotundata, basi obtusa, rotundata vel subcordata, 1·2–4·5 cm. longa, 0·8–3 cm. lata, tenuiter coriacea, glabra, 3–5-nervia, nervis valde obliquis prominulis, alia ovato-oblonga vel anguste oblonga, apice obtusa vel rotundata, basi sagittata, 1·2–3·5 cm. longa, 6–8 mm. lata. *Umbellae* solitariae, 3–5-florae, basi saepius foliatae; pedunculus 0·5–1 cm. longus; pedicelli graciles, 0·5–0·8 cm. longi; bractea patelliformis lobo dorsali breviter ovato, valde acute umbonata, umbone 0·5–0·8 mm. longo, margine dorsali 1 mm. longo, ventrali 0·25 mm. longo. *Torus* cupularis, 3–3·5 mm. longus. *Calyx* patulus, 1·3 mm. longus. *Petala* circiter 4·5 cm. longa, subacuta, superne oblanceolato-linearia, 1·3–1·5 mm. lata, medio 1 mm. lata, ab 4 mm. infra insertionem filamentorum deorsum valde ampliata, circiter 3 mm. lata juxta basin, paribus 4–5 plicarum obliquarum ex parte adnata filamentum ortarum. *Filamenta* 0·7–1·5 cm. supra basin petalorum inserta, 1·8–2 cm. longa, applanata, sursum leviter angustata; antherae lineares, 9–10 mm. longae, deorsum leviter angustatae. *Stylus* inferne rectus; stigma capitatum, 0·8 mm. diametro.—*L. undulatus*, var. *sagittaeifolius*, Engl. Pflanzenw. Ost-Afr. vol. C., p. 167, t. 18, ff. A–C; Engl. in Engl. Jahrb. vol. xxx., p. 304.

TROPICAL AFRICA. British East Africa: in the coast districts, *Battiscombe*, 162; Kibwezi, on Leguminosae, *Scheffler*, 338; Kapte Plains, *Gregory*; Gondeona, on the Umba River, *Kässner*, 116. German East Africa: Usambara; Gombelo, *Holst*, 2173; Masheua, *Holst*, 8835; Muoa, *Holst*, 3103; Kilimanjaro Region, Lake Jalla, *Volkens*, 337; Usafua, lower slopes of Poroto Mountain, 1700 m., on *Acacia* sp., *Goetze*, 1038.

1195. *Loranthus* (Rufescentes) *leonensis*, *Sprague*, in *Dyer*, Fl. Trop. Afr. vol. vi. sect. 1, p. 282, anglice [*Loranthaceae-Euloranthaceae*]; affinis *L. nigritano*, Hook. f., a quo floribus breviter pedicellatis, bractea calycem haud aequante recedit.

Ramuli juniores pilis multiramosis ferrugineo-tomentosi vel pubescentes, seniores glabri. *Folia* oblongo-lanceolata vel elliptico-oblonga, breviter obtuse acuminata, basi rotundata, 4–11.5 cm. longa, 2–4.5 cm. lata, coriacea, supra opaca, statu juvenili excepto glabra, subtus ferrugineo-tomentosa vel pubescentia; petioli 2–8 mm. longi. *Fasciculi* densi, multiflori, ferrugineo-tomentosi; pedicelli 1.5 mm. longi; bractea deltoideo-ovata, circiter 2 mm. longa, intus glabra. *Torus* 1.3–1.8 mm. longus. *Calyx* 0.8–1.3 mm. longus, pilis 0.5 mm. longis ciliatus. *Corolla* 3.8 cm. longa, extus pilis patentibus verticillatim ramosis ferrugineo-tomentosa; tubus intus minute glandulosus, ampulla basali 3 mm. longa 2 mm. diametro; lobi patuli vel patentes, spatulato-lineares, circiter 11 mm. longi. *Filamenta* circiter 2 mm. supra basin corollae loborum inserta, sursum sensim angustata, 5–5.5 mm. longa, basi 0.5 mm. lata, superne 1–1.5 mm. connata, glabra; antherae lineares, 2–2.5 mm. longae; locelli 6–7 in quaque serie verticali. *Discus* pilis erectis rigidis 0.5–0.8 mm. longis dense ferrugineo-pilosus. *Stylus* glaber, superne metuliformis, collo 2–2.3 mm. longo; stigma ellipsoideum, 0.5 mm. longum.

TROPICAL AFRICA. Sierra Leone: Bagroo River, *Mann*; Oldfield's Farm, on *Psidium pyrifera*, Linn., *Barter*; Wallia, Scarcies Valley, *Scott-Elliott*, 4578; Talla Hills, near Lumbaraya, *Scott-Elliott*, 4997; Falaba, by Dantilia River, *Scott-Elliott*, 5294; near Kabusa (Limba), *Scott-Elliott*, 5472.

1196. *Erythrococca olacifolia*, *Prain* [*Euphorbiaceae-Crotoneae*]; species *E. miti*, Pax, et *E. rigidifoliae*, Pax, quam maxime affinis, ab ambabus tamen ovario dense adpresse strigoso facillime distinguenda.

Frutex, ramulis glabris, cortice pallido lenticellato; gemmae perulatae, squamis persistentibus. *Folia* petiolata, membranacea, ovato-lanceolata, obtusa, basi late cuneata, margine regulariter crenata, 6.5–8 cm. longa, 2.5–4 cm. lata, saturate viridia, glabra, nervi laterales utrinsecus subtus elevati; petiolus parce pubescens, supra canaliculatus, 0.8–1.2 cm. longus; stipulae cartilagineae, persistentes, in mammillas vel spinas perbreves mutatae. *Flores* minuti, in glomerulos axillares breve pedunculatos aggregati; pedunculi graciles, parce pubescentes, 4 mm. longi, feminei subglabri 6 mm. longi; pedicelli prope basin articulati, masculi glabri, capillares, 8 mm. longi, feminei rigiduli 3 mm. longi. *Calyx* masculus viridis, glaber; lobi 3, tenue membranacei, fere ad basin usque partiti. *Stamina* plerumque 12, exteriora 8, cetera centralia; filamenta loculos antherarum subglobosos excedentia; glandulae receptaculares minutae, glabrae, 5 exteriores ovatae, subcompressae, liberae, in anulum stamina cingentem dispositae, ceterae rhomboideae, juxtastaminales, filamentis seriei staminum exterioris basi 2-glandulosis. *Calyx* femineus quam calyce maris minor; lobi 3, margine minute ciliati. *Ovarium* dense adpresse strigosum, 3-loculare; styli 3, liberi, a basi fimbriato-laciniati. *Discus* e squamis 3 liberis lineari-ovatis ovarii

loculis alternantibus ovarioque aequilongis compositus. *Capsula* saepissime abortu 1-2-cocca, viridis, parce setosa. *Semina* rubescentes; testa minutissime reticulata.

TROPICAL AFRICA. Nile Land: Uganda; Toro, Bukarungu, 884 m., *Bagshawe*, 1191.

1197. *Erythrococca usambarica*, *Prain* [Euphorbiaceae-Crotoneae]; affinis *E. abyssinicae*, Pax, sed foliis minus rigidis stipulis rarissime spinulosis racemis masculis brevioribus pedunculo hirsutis, pedicellis masculis brevioribus glandulisque receptaculi haud piligeris facillime sejungenda.

Frutex 1-3-metralis, ramulis gracilibus glabris, basi annulo perularum cinctis, cortice cinereo lenticellato. *Folia* breviter petiolata, ovato-lanceolata, in apicem obtuse acuminatum attenuata, basi late cuneata vel rotundata, margine distanter glanduloso-crenato-dentata, membranacea, 3.5-5 cm. longa, 2-2.5 cm. lata, supra laete viridia, subtus pallidiora, utrinque glabra; nervi utrinsecus 3-4, adscendentes, indistincti; petiolus parce puberulus vel glaber supra canaliculatus, 3-4 mm. longus; stipulae rarissime in aculeas conicas 2 mm. longas fragiles mutatae. *Flores* minuti, racemosi, racemis masculis axillaribus pedunculo gracili parce puberulo 1-1.25 cm. longo, pedicellis capillaribus glabris prope basin articulatis 2 mm. longis, bracteolis ovatis minutis saepe plurifloris. *Calyx* viridis, membranaceus, glaber, in alabastro subsphaerico minute apiculato clausus dein profunde valvatim 4-(rarissime 5-) partitus, lobis ovatis acutis. *Stamina* 6-7, exteriora 5, cetera centralia glandulis juxtastaminalibus rhomboideis glabris intermixta glandulisque extrastaminalibus 5 glabris subbilobis circumcincta; filamenta antheris obovoideis longiora. *Flores* foeminei adhuc ignoti. *Fructus* 2-coccus, didymus vel abortu 1-coccus, glaber, 6 mm. latus; styli a basi fimbriati; glandulae hypogynae 2; cocci loculicide dehiscentes. *Semina* sphaerica, testa reticulata.

TROPICAL AFRICA. Mozamb. Dist.: German East Africa; Usambara, Derema, *Scheffler*, 160; near Amani, 915 m., *Engler*, 708; Handei, Nquelo, 900 m., *Heinsen*, 74.

Very nearly allied to *E. (Deflersia) abyssinica*, Pax, but the facies of the plant, owing to the smaller size and thinner texture of the leaves, is quite different and very distinctive.

1198. *Erythrococca zambesiaca*, *Prain* [Euphorbiaceae-Crotoneae]; species *E. natalensi*, Prain, et *E. berberideae*, Prain, proxima, ab ambabus tamen floribus minutis facile distinguenda; ab hac etiam differt foliis valde tenuioribus, ab illa staminibus paucioribus.

Frutex, ramulis parce adpresse pubescentibus, cortice pallido lenticellato; gemmae perulatae squamis persistentibus. *Folia* breve petiolata, membranacea, ovata, obtusa vel subacuta, basi cuneata, margine obscure crenulata, 2-2.5 cm. longa, 0.8-1 cm. lata, pallide viridia, pilis perpaucis adpressis secus nervos subtus exceptis glabra; nervi laterales utrinsecus 2-3, adscendentes; petiolus parce adpresse pubescens, supra canaliculatus, 4 mm. longus; stipulae cartilagineae, persistentes, in aculeos basi crassos apice pungentes mutatae. *Flores* minuti in racemos axillares dispositi;

pedunculi gracillimi 4–6 mm. longi et rhachides pedunculis brevioribus adpresse pubescentes; pedicelli masculi capillares, glabri, 5 mm. longi, prope basin articulati. *Calyx masculus* viridis, glaber, in alabastro depresso-globosus minute apiculatus; lobi saepius 4, nonnunquam 5, casu 3, fere ad basin usque partiti. *Stamina* nunc 15, nunc 18, exteriora 9, cetera centralia; filamenta antherarum loculos subglobosos excedentia; glandulae complanatae, ambitu ovatae, albo-ciliatae; exteriores 6 in urceolum lobatum extrastaminalem connatae, ceterae juxtastaminales. *Flores femineae* et fructus ignoti.

TROPICAL AFRICA. Mozamb. Dist.: Nyassaland; Chiromo, *Scott Elliot*, 2795.

A very distinct species, in foliage and armature most resembling *E. natalensis*, with which it also agrees in the shape and arrangement of the receptacular glands, but from which it is readily distinguished by its minute green flowers with fewer stamens, and by its smaller leaves.

1199. *Erythrococca natalensis*, *Prain* [Euphorbiaceae-Crotonae]; affinis *E. aculeatae*, Benth., sed floribus majoribus racemis laxifloris, calyce maris semper 4-partito, pedicellis prope basin articulatis, staminibus numerosioribus glandulas receptaculi manifeste excedentibus glandulisque extrastaminalibus et staminibus seriei extimae 10 nec 5 differt.

Frutex, ramulis gracilibus junioribus parce pubescentibus cito glabris, basi annulo perularum deciduarum cinctis, cortice pallido lenticellato. *Folia* breviter petiolata, ovato-lanceolata, acuta vel obtusa, basi angustata, margine distanter glanduloso-crenato-dentata, tenuiter membranacea, 2.5–4 cm. longa, 1.25–2 cm. lata, laete viridia, opaca, utrinque glabra; nervi utrinsecus 2–3, adscendentes, indistincti; petiolus glaber, supra canaliculatus, 2–3 mm. longus; stipulae in aculeos conicos pungentes 2 mm. longos mutatae. *Flores* parvuli, racemosi, racemis masculis axillaribus pedunculo gracili glabro 1–2 cm. longo paucifloro, pedicellis capillaribus glabris supra basin articulatis 3–5 mm. longis, bracteolis ovatis acutis minimis saepissime 2–3-floris vel nonnunquam 1-floris. *Calyx* albidus, tenuiter membranaceus, in alabastro subsphaerico minute apiculato clausus dein profunde valvatis 4-partitus, lobis ovatis acutis. *Stamina* circiter 30, exteriora 10, cetera centralia, glandulis juxtastaminalibus ovatis piligeris intermixta glandulisque extrastaminalibus 10 piligeris annulatim circumcincta; filamenta antherarum locellis subglobosis longiora. *Flores femineae* adhuc ignoti.

SOUTH AFRICA. Natal: Inanda, Mt. Edgecumbe, *Wood*, 1089; Mt. Moreland, 150 m., *Wood*, 1391; without precise locality, *Gerrard*, 81.

The only other species of this genus hitherto known with deciduous bud-scales and much enlarged stipular spines is *E. aculeata*, Benth., on which the genus was founded, but the plant here described is very distinct from *E. aculeata* on account of its larger flowers with more numerous stamens and relatively smaller receptacular glands.

1200. *Erythrococca berberidea*, *Prain* [Euphorbiaceae-Crotonaceae]; species *E. natalensi*, *Prain*, quam maxime affinis sed foliis rigidioribus acutatis floribusque minoribus staminibusque paucioribus apte distinguenda.

Frutex, ramulis glabris, cortice pallido lenticellato; gemmae perulatae. *Folia* breve petiolata, chartacea, ovato-lanceolata vel ovata, apice acuta, basi nunc late nunc anguste cuneata, margine regulariter et distincte serrata, 4-6 cm. longa, 1.5-2 cm. lata, intense viridia, supra glabra, subtus glabra vel pilis perpaucis adpressis secus nervos obsita, nervi laterales utrinsecus 2 vel 3, adscendentes, praeter imos subbasales elongatos valde obscuri; petioli prope insertionem parce adpresse pubescentes ceterum glabri, supra canaliculati, 3 mm. longi; stipulae cartilagineae, persistentes, in aculeos 2-3 mm. longos saepissime mutatae. *Flores* parvuli in racemos paucifloros axillares dispositi; pedunculi glabri 4 mm. longi et rhachides glabrae 1 cm. longae, floribus ad nodos 1-2 mm. distantes masculis glomeratis femineis singulis; pedicelli glabri, masculi capillares, 1 cm. longi, 1-2 mm. supra basin articulati, feminei 6 mm. longi, crassiores. *Calyx* masculus albidus, glaber; alabastra globosa minute apiculata; lobi 4, fere ad basin usque partiti. *Stamina* 15-18, 8-10 exteriora, cetera centralia; filamenta antherarum loculos subglobosos excedentia, glandulis 5 complanatis extrastaminalibus margine ciliatis circumcincta et aliis late complanatis apice hirsutis intermixta. *Calyx* femineus viridis, 3-lobus, lobis ovatis subacutis margine ciliatis. *Ovarium* glabrum, 3-loculare; styli 3, liberi, a basi fimbriati. *Discus* e squamis 3 liberis triangularibus submembranaceis calyce brevioribus ovarii loculis alternantibus compositus. *Capsula* saepius abortu 2-cocca vel monococca, 8 mm. lata. *Semina* fere sphaerica.

SOUTH AFRICA. Natal: near Durban, 60 m., *Medley Wood*, 7582.

Very nearly allied to the other Natal species and like it somewhat closely allied to the original *E. aculeata* from Sierra Leone, as well as to *E. zambesiaca* from Chiromo.

1201. *Erythrococca Ledermanniana*, *Prain* [Euphorbiaceae-Crotonaceae]; affinis *E. hirtae*, *Pax*, sed foliis minoribus fere glabris, staminibus numerosioribus filamentisque longioribus facillime distinguenda.

Frutex vel *arbuscula* 2-5-metralis, ramulis gracilibus parce pubescentibus, basi annulo perularum persistentium cinctis, cortice pallido lenticellato. *Folia* breve petiolata, ovata, acuta, basi late cuneata, margine indistincte dentata, 4-5 cm. longa, 2-2.5 cm. lata, pallide viridia, pilis perpaucis secus nervos exceptis utrinque glabra et minute verruculosa; petiolus parce pubescens, supra canaliculatus, 6 mm. longus; stipulae cartilagineae, induratae, nonnunquam in mammillas latiusculas mutatae. *Flores* perparvi, racemosi, racemis masculis axillaribus, pedunculo gracili parce hispidulo 5 mm. longo; pedicellis capillaribus glabris 3-4 mm. longis prope basin articulatis; bracteolis parvis. *Calyx* maris viridis, glaber vel apice parce pubescens, in alabastro globoso minute apiculato clausus dein profunde valvatum 3-partitus, lobis triangulari-ovatis. *Stamina* 27, exteriora 10, cetera centralia,

glandulis juxtastaminalibus rhomboideis apice hirsutis intermixta; filamenta antherarum locellis triplo longiora. *Flores feminei* adhuc ignoti.

TROPICAL AFRICA. Upper Guinea: Cameroons; Esolé, on Mt. Basso, 1860 m., *Ledermann*, 2032; Mfongu, slopes of Muti, 1700–1920 m., *Ledermann*, 5877.

Nearly allied to *E. hirta*, Pax, which in turn is very closely related to *E. trichogyne* (*Claoxylon trichogyne*, *Muell.-Arg.*), and to *E. Mildbraedii* (*C. Mildbraedii*, Pax). These four species appear to constitute a very definite natural group. The male flowers of *E. trichogyne* are unknown but those of the other two species are readily distinguished from the male flowers of *E. Ledermanniana* by having fewer stamens.

1202. *Claoxylon* (*Athroandra*) *patulum*, *Prain* [Euphorbiaceae-Crotoneae]; affinis *C. Mannii*, Hook. f., sed foliis majoribus pallidioribus hispidis nervis numerosioribus petiolisque brevioribus, staminibus numerosioribus facillime distinguenda.

Arbuseula vel *frutex*, ramulis gracilibus hispidis, basi annulo perularum persistentium cinctis, cortice fusco hispido lenticellato. *Folia* breve petiolata, ovata vel anguste elliptica, abrupte acuminata acumine ad 2.5 cm. usque longo, basi rotundata, margine minute et distanter sed distincte glanduloso-dentata, tenuiter membranacea, 20–25 cm. longa, 6–8 cm. lata, pallide viridia, pilis patentibus praesertim secus nervos utrinque hispida, vel nonnunquam pilis patentibus perpaucis secus nervos faciei inferioris exceptis glabra, subtus minute verruculosa; nervi utrinsecus 8–10, primum subpatentes dein adscendentes, intra marginem anastomosantes; petiolus 6–8 mm. longus, pilis patentibus hispidus. *Flores* parvi, racemosi, racemis axillaribus pedunculo maris glabro gracillimo rigidulo 3–5 cm. longo, pedicellis maris capillaribus glabris prope basin articulatis 1.2–3 cm. longis, bracteolis membranaceis lanceolatis 1.5 mm. longis plurifloris. *Calyx* maris pallide viridis, membranaceus, glaber, in alabastro pyramidal-conico clausus dein profunde valvatis 4-lobus, lobis anguste triangularibus apice acuminato incrassatis. *Stamina* alba, 50–54, exteriora 10, cetera centralia, glandulis juxtastaminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Flores feminei* et fructus adhuc ignoti.

TROPICAL AFRICA. Upper Guinea: Cameroons; Jabassi, 60–100 m., *Ledermann*, 1063, 1106.

Most nearly related to *C. (Athroandra) Mannii*, Hook. f., with which it agrees in having pyramidal-conic not subglobose buds, but from which it differs in having much paler leaves more or less hispidly hairy, with twice as many nerves.

1203. *Claoxylon* (*Athroandra*) *Poggei*, *Prain* [Euphorbiaceae-Crotoneae]; species *C. columnari*, *Muell.-Arg.*, similior eo quoad antherarum numerum congruens, differt tamen indumento pilorum patentium composito et praecipue bracteolis longioribus linearibus subulatis.

Frutex, ramulis gracilibus pilis patentibus pubescentibus, basi annulo perularum persistentium cinctis, cortice viridescente lenticellato. *Folia* distincte petiolata, anguste ovata, acute

acuminata, basi cuneata, margine irregulariter breve sed densius crenato-dentata, membranacea, 5-6 cm. longa, 2.5 cm. lata, supra saturate viridia, subtus pallidiora, utrinque sed praesertim subtus et secus nervos pilis patentibus hispidula; nervi utrinsecus 3-4, graciles, adscendentes, intra marginem anastomosantes; petiolus 6 mm. longus, pilis patentibus hispidulus. *Flores* parvi, racemosi, racemis axillaribus pedunculo maris gracile hispidulo 2.5-3 cm. longo, pedicellis maris capillaribus glabris prope basin articulatis 6 mm. longis; bracteolis herbaceis subulatis 2 mm. longis plurifloris. *Calyx* maris viridis, membranaceus, glaber, in alabastro e basi lata breviter conico clausus dein profunde valvatim 4-lobus, lobis late triangularibus apice acuminato incrassatis. *Stamina* ultra 60, exteriora 10, cetera centralia, glandulis juxta-staminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Flores* feminei et fructus adhuc ignoti. *C. columbare*, Engl. in Sitz. Preuss. Akad. Wiss. xxxviii. p. 829; nec Muell. Arg.

TROPICAL AFRICA. Congo State: Lualaba-Kasai Dist.; Mukenge, Pogge, 1373; Kwango Dist., Butaye; environs of Lazaret, Vanderyst.

1204. *Claoxylon* (*Athroandra*) *oleraceum*, Prain [Euphorbiaceae-Crotoneae]; affinis *C. atrovirenti*, Pax, sed foliis saturatius viridibus maturitate rigidioribus fere glabris nervis paucioribus magisque prominentibus, pedicellis brevioribus fructibusque minoribus satis distincta.

Frutex 1-3-metralis, ramulis gracilibus sparse puberulis, basi annulo perularum persistentium cinctis, cortice brunneo vel cinereo lenticellato. *Folia* distincte petiolata, ovata vel oblonga, acuminata, basi rotundata, margine minute glanduloso-dentata, matura rigidiuscula, 7-18 cm. longa, 4-8 cm. lata, supra saturate viridia, subtus pallidiora minutissime verruculosa, et parce persistenter pubescentia praesertim secus nervos; nervi utrinsecus 3-5, subpatentes, intra marginem distincte anastomosantes et maturitate distincte subtus elevati; petiolus parce adpresse pubescens, 0.8-1.2 cm. longus. *Flores* parvuli, racemosi, racemis axillaribus, pedunculo gracili parce pubescente maris ad 2.5 cm. usque longo, feminei 2 cm. longo, pedicellis capillaribus glabris prope basin articulatis, maris 0.8-1.2 cm., feminei 2 mm. tantum longis, bracteolis ovatis membranaceis parvis maris plurifloris, feminei 1-floris. *Calyx* maris albidus, membranaceus, glaber, in alabastro subsphaerico minute apiculato clausus dein profunde valvatim 4-lobus, lobis ovatis acutis. *Stamina* 30-40, exteriora 10, glandulis juxta-staminalibus rhomboideis apice pilis elongatis viscidulis onustis intermixta; antherarum locelli obovoidei; filamenta fere obsoleta. *Calyx* feminei 2-lobus, lobis ovatis acutis. *Discus* hypogynus distinctus, cupularis, altero latere margine integer sed inaequalis altero angustatus. *Ovarium* 2-loculare, glabrum; stylus crassus, perbrevis, stigmatibus 2 ovatis vel lineari-ovatis integris laevibus divaricatis coronatus. *Fructus* cinnabarinus, 2-coccus, didymus vel casu abortu 1-coccus, glaber, 6 mm. latus, stylo stigmatibusque nunc recurvis coronatus; cocci loculicide dehiscentes. *Semina* cinerea, fere sphaerica, manifeste reticulata.—*C. Barteri*, Hook. f., Journ. Linn. Soc. vi. p. 21, partim et quoads pp. *Barteriana* in insula Lagos lecta tantum. *C. africanum*, Muell.-Arg. in DC.

Prodr. xv. 2, p. 777 partim et quoad Barter n. 2223 tantum; De Wild. et Dur. in Bull. Herb. Boiss. sér. 2, i. p. 47 et in Ann. Mus. Congo, Bot. sér. 3, ii. 209; De Wild. Miss. Laurent, i. p. 130 et in Ann. Mus. Congo, Bot. sér. 5, ii. p. 279 (spp. Sapiiniana in regione Lualaba-Kasai excludenda); Rendle in Journ. Linn. Soc. Bot. xxxvii. p. 213; nec *Trewia*? *africana*, Baill.

TROPICAL AFRICA. Upper Guinea: S. Nigeria; Lagos Island, Barter, 2223. Cameroons; Tchâpe Pass, 1500 m., Ledermann, 2845; Tibati, 890 m., Ledermann, 2433; Yaunde, 800 m., Zenker and Staudt, 211; Zenker, 184, 499, 712. Lower Guinea: Spanish Guinea; Bebao, Tessmann, 555. Nile Land: Uganda; coast of Lake Victoria Nyanza, 1220 m., Bagshawe, 588. Congo State: Stanley Pool Dist., Kisantu, Gillet, 37, 74, 1419, 1865; Kimuenza, Gillet, 2144; Lukolela, Dewevre, 748; Injolo, Ledoux and Huyghe, 22; Lulonga, Pynaert, 767; Eala, Pynaert, 525, 920; Bangala Dist., Bumba, Laurent; Abumonbasi, Thonner, 200; Leopold II. Dist., near Lake Leopold II., Body, 92.

This is very closely related to *C. atrovirens*, Pax and more especially to the form of *C. atrovirens* which has been distinguished by Pax under the name *C. inaequilaterum*. As a rule the leaves differ markedly in shape and are much more sparingly pubescent but in some of the gatherings the leaves of the two much resemble each other. The female flowers of *C. atrovirens* and *C. oleraceum* are not distinguishable but the fruit of *C. oleraceum* is smaller and more deeply depressed between the cocci than is the case in *C. atrovirens* while the seeds in our plant are more deeply reticulated than those of its near ally. *C. Barteri* Hook. f. (*C. africanum*, Muell.-Arg.), to which this species has hitherto been referred, differs in having a much shorter style with subglobose and papillose stigmas and in having a shallow urceolate hypogynous disk, slightly 5-lobed in fruit. Its leaves also are smaller and are thinly membranous even when quite mature. We are indebted to the kindness of Dr. Engler and of Dr. De Wildeman for an opportunity of studying the extensive series of specimens of this species which are preserved in the Berlin and the Brussels herbaria. From the field notes accompanying many of the specimens collected in the Congo State it would appear that throughout the area in which it occurs the leaves of this plant are generally used as a vegetable. In monographing the genus *Claoxylon* it will be found desirable to transfer the section *Athroandra* to the allied genus *Erythrococca*, Benth.

1205. *Claoxylon* (*Athroandra*) *macrophyllum*, Prain [Euphorbiaceae-Crotoneae]; species *C. hispida*, Pax, et *C. Dewevrei*, Pax, valde affinis ab ambobus tamen ramulis pedicellis petiolisque adpresse molliter pubescentibus nec patule hispidis, lamina basi angustiore, petiolisque longioribus differt.

Frutex, ramulis molliter adpresse pubescentibus; gemmae perulatae squamis persistentibus. *Folia* petiolata, membranacea, obovato-lanceolata, apice acuminata, basi cuneata, margine subundulato crebre sed breviter crenata, 22.5-25 cm. longa 7-7.5 cm. lata, saturate viridia, subtus pallidiora, supra primum sparse pubescentia praesertim secus nervos, cito glabrescentia, subtus secus nervos nervulosque persistenter adpresse pubescentia; nervi laterales

utrinsecus 5-6, adscendentes, intra marginem anastomosantes; petiolus sparse adpresse pubescens, supra canaliculatus, 1.25-2 cm. longus; stipulae minutae, subulatae. *Flores* parvi, in racemos axillares dispositi, masculi tantum noti; pedunculi pergraciles, adpresse sericei, 1.25-2 cm. longi; pedicelli glabri, capillares, 6-8 mm. longi, prope basin articulati. *Calyx* masculus viridis; glaber, in alabastro globosus minute apiculatus; lobi 4, fere ad basin usque partiti. *Stamina* 24, quorum exteriora 10, cetera centralia; antherarum loculi obovoidei filamenta excedentes; glandulae juxta-staminales rhomboideae apice pilis elongatis viscidis hirsutae. *Flores feminei* fructusque ignoti.

TROPICAL AFRICA. Congo State: Eastern Province; Fort Beni, Kwa Muera, *Mildbraed*, 2197.

Apparently very nearly allied to, and as regards its male flowers not distinguishable from *C. hispidum*, Pax, a species confined to the Cameroons, and to *C. Dewevrei*, Pax, which occurs both in the Cameroons and in the south-eastern portion of the Congo State. It differs, however, from both species in shape of leaf and in the absence of the spreading hispid hairs which occur on the petioles, peduncles and main nerves of the leaves in the two species mentioned. The section *Athroandra* is probably more satisfactorily referred to *Erythrococca* than to *Claoxylon*, on account of the character of its buds.

1206. *Urera Woodii*, *N. E. Brown* [Urticaceae-Urticeae]; similis *U. cameroonensi*, Wedd., sed foliis pro portione brevioribus et latioribus basi obtusioribus, cymis ramosioribus et floribus minoribus differt.

Frutex diffusus, ramis glabris inermibus. *Folia* alterna, coriacea, integra, basi trinervata, utrinque glabra vel pilis urentibus paucis subtus secus nervos et in apice petioli armata; petiolus 1.5-3 cm. longus; lamina 6-9 cm. longa, 3-6 cm. lata, late elliptica vel rotundato-ovata, apice cuspidato-acuminata, basi obtusa, late rotundata vel subcordata, exsiccata cystolithis minutis utrinque dense oblecta. *Stipulae* 5-10 mm. longae, attenuato-ovatae, acutae. *Cymae* masculae 4-7 cm. longae, 2.5-4 cm. latae, multiramosae, inermes; femineae 2.5-3.5 cm. longae, 3-5 cm. latae, ramosissimae, pilis urentibus armatae. *Flores* sessiles:—masculi calicis lobis 2 mm. longis ovato-oblongis apice subtruncatis minute denticulatis; feminei calyce tubuloso ovarium aequante apice 4-crenulato crenulis minutissime denticulatis. *Achaenium* fere 2 mm. longum, semiexsertum; stigma subsessile, capitatum, magnum, fulvum.

SOUTH AFRICA. Pondoland: in a cutting to the lighthouse near Port St. John, *Miss A. Pegler*, 1533. Natal; near Umzinyati Falls, *Wood*, 1803, and without precise locality, *Sanderson*, 594.

1207. *Sansevieria gracilis*, *N. E. Brown* [Liliaceae-Dracaeneae]; species suffruticosa, ramosa, foliis teretibus et perianthio basi minute tuberculato distinctissima.

Suffruticosa, breviter caulescens, ramosa; rami 15-20 cm. longi, 6 mm. crassi, apice foliosi. *Folia* 22-60 cm. longa, 6-11 mm. crassa, teretia, basi brevissime vaginata, apice spinoso-acutissima, obscure viridia, atroviridi-lineata, juniora inconspicue zonata, laevia. *Racemus* laxus, 6-7 cm. longus. *Pedicelli* 2-2.5 mm. longi, supra

medium articulati. *Perianthium* album; tubus 2 cm. longus, gracilis, ad basin obconicam minute tuberculatus; lobi 1 cm. longi, lineares, obtusi, revoluti.

TROPICAL AFRICA. British East Africa: Mazeras, common, *Powell*, 11.

1208. *Sansevieria Jacquinii*, *N. E. Brown* [Liliaceae-Dracaeneae]; affinis *S. guineensi*, Willd., sed foliis longioribus marginibus viridibus facile distinguitur. *Aletris guineensis*, Jacq., Hort. Vindobon. vol. 1, p. 36, t. 84.

Acaulis. *Folia* solitaria vel bina, 60-120 cm. longa, 4·2-7 cm. lata, anguste lanceolata, subulato-acuta, basi in petiolum longum attenuata, viridia, fasciis transversis dilutioribus variegata, marginibus viridibus. *Racemus* cum pedunculo ad 45 cm. longus. *Fasciculi* 3-6 flori. *Flores* subsessiles, albi; tubus 25 mm. longus, lobi 22 mm. longi, lineares, obtusi.

Origin unknown, but probably a native of West Tropical Africa.

1209. *Sansevieria Pearsonii*, *N. E. Brown* [Liliaceae-Dracaeneae]; affinis *S. cylindricae*, Boj., sed foliis brevioribus distincte canaliculatis differt.

Acaulis. *Folia* disticha, erecta, rigida, 6·8-8·3 dm. longa, basi 3-4 cm. crassa, cylindrica, acuta, antice acute canaliculata, laevia. *Inflorescentiam* et flores non vidi. *Pedicelli* fasciculati, in fructu 9 mm. longi, infra medium articulati. *Baccae* aurantiacae.

TROPICAL AFRICA. South Angola: among rocks in open forest, near kilometre 108·5 on the Mossamedes Railway, 500 m., *Pearson*, 2073.

1210. *Sansevieria singularis*, *N. E. Brown* [Liliaceae-Dracaeneae]; species foliis solitariis validis longissimis cylindricis distinctissima.

Acaulis. *Folium* solitarium, erectum, 0·45-2·60 m. longum, basi 2-4·3 cm. crassum, cylindricum, acutum, demum 5-9-sulcatum, scabridulum, brunnescens vel griseo-virens, leviter subglaucescens, junioribus obscure zonatis. *Flores* ignoti.

TROPICAL AFRICA. Uganda: by the river, mile 150-200, *Tompson*. British East Africa: Voi, common, *Powell*, 2.

VII.—RUBBER CULTIVATION IN TOGOLAND AND GERMAN EAST AFRICA.

The following account of the cultivation of *Manihot Glaziovii*, and other rubber-producing plants in Togoland and German East Africa, has been translated from a paper entitled "Der Kautschuk in den deutschen Kolonien," by Prof. Warburg, published in *L'Agronomie Tropicale*, 1910, Nos. 7 and 8, pp. 190-192 and p. 235. The paper, of which the account reproduced forms a part, was presented at the International Congress for Tropical Agriculture held at Brussels last year.

It should be remembered in reading this note that *Kickxia elastica* is now more usually known under the name *Funtumia elastica*.

"Togoland.—The cultivation of rubber in Togo has hitherto been very insignificant. Rubber-growing has been taken up by only one of the two plantation-companies, viz., the Agu Planting Company, and about 140 hectares have been planted with *Manihot Glaziovii*, and 30 hectares with *Kickxia elastica*. The latter plant, however, does not thrive. It evidently suffers during drought, yields scarcely any latex, frequently dies off, and is being slowly replaced by *Manihot*. *Manihot Glaziovii* develops excellently, and the increase in production is large, the twenty oldest trees having yielded 160 grams on an average last year. Also the tapping is very simple, since the sap remains fluid (here but not in East Africa), and can therefore be collected in basins after the usual methods of cutting. The expense of tapping amounts to less than one mark per kilogram of dry rubber, and this is only a third of the cost for the same tree in East Africa. As there is no lack of cheap and good labour, the cultivation of this plant will presumably extend considerably here. *Ficus elastica* develops quite favourably on the Agu-plantation, but only $1\frac{1}{2}$ hectares are planted with it.

"German East Africa is the land of the cultivation of *Manihot Glaziovii*. This species was planted experimentally at Tanga and in Dar-es-Salaam in the years between 1890 and 1900, but for a long time there was no success in obtaining any production worth considering. The attempt was on the point of being given up, when at last in 1900 the planter Köhler succeeded in discovering a suitable method of tapping. This was on the Lewa plantation near Tonga. The Lewa-method, as it is called, is carried out in the following way: Portions of the cortex are cleaned by the removal of pieces of bark and are painted over with dilute acetic, citric, or carbolic acid, or latterly with fluoric acid (purub), and then almost point-like incisions are made. From these the latex flows out, and coagulates on the spot as thin tears of rubber. These are collected and worked up into round balls.

"Since the discovery of this method the cultivation of this easily grown tree has rapidly increased. At the beginning of 1902 there were about 300,000 trees already planted out, in April 1904 about half a million, in April 1905 nearly a million, and at the beginning of 1907 five millions. At the present time there should be at least eight million trees, corresponding to about 8000 hectares. About 1000 trees are planted to the hectare, but recently there is a tendency in favour of the view that wide planting is more correct, e.g. 4×4 meters, i.e. 625 trees to the hectare. To judge from experimental tappings the production is quite satisfactory. According to Prof. Zimmermann, one may count on 100 gm. of rubber in the third or fourth year, 125 in the fourth or fifth, 200 in the fifth or sixth, 300 in the sixth or seventh, 400 in the seventh or eighth, 500 in the eighth or ninth. Although individual trees have been known to give 5–6 kg. of rubber, it is probable, according to Geheimrat Stuhlmann, that the yield will not be more than 125 gm. per tree, if one takes the average of a large number, i.e., 125 kg. per hectare, and in the third and fourth years one should reckon on only 25 kg. per hectare. With economical management the expense per kilogramme should amount to 2·80 marks for tapping, including the cost of recruiting and of building huts,

and the cost of coagulation. This is three times as high as for *Manihot* in Togo, and five times as high as for *Kickxia* in the Cameroons. It must also be taken into account that *Manihot*-rubber fetches a considerably lower price than *Kickxia*-rubber. Generally the labourer collects each day only 500 grm. of wet rubber, corresponding to 250 grm. of the dry product. Thus to obtain 125 kg. of dry rubber per hectare, 600 working days are necessary, and consequently, allowing for the rainy season, holidays, &c., about three labourers to the hectare are required. With the rapid increase in the cultivation of rubber, it must, however, be assumed that the available number of labourers will soon be insufficient. Even the 8000 hectares, which have now been planted, will require 24,000 labourers for the collection of all the rubber. On the other hand the method of tapping has recently been improved, nearly the whole of the outer cortex being now removed several times a year. With this improvement in method it is hoped that larger incisions can now be employed, and that 2 kg. of wet or 1 kg. of dry rubber per labourer per day may be obtained. Should this prove correct, the cost-price would be materially less, and also the number of labourers required would be reduced to one-fourth.

"The rubber not only includes all sorts of impurities, on account of its mode of preparation, but it also contains much more resin than the better kinds among other rubbers. It therefore only fetches a little more than half the price of Para-rubber, and is even 25-30 per cent. cheaper than good African liane-rubber. It was consequently difficult to find a market for it at times when rubber was abundant; but, with the high prices of the present day, it is now much in request. The export of plantation-rubber from East Africa is naturally only of very recent date. Lewa, the oldest plantation, exported $3\frac{1}{2}$ tons (Tonnen) in 1905, $7\frac{1}{2}$ in 1906, and $12\frac{1}{2}$ in 1907.

"In the year 1908, however, 87 tons of plantation-rubber, of the value of 416,000 marks were exported from East Africa, as against 124 tons of wild rubber having a value of 576,000 marks. When once the 8000 hectares are ready for the collection of rubber, 1000 tons may be expected from them, and the value of this would be 7-8 million marks. Thus even in the next few years plantation-rubber will have far outstripped wild rubber in East Africa, and will probably be the most important article of export of the country. Other species of the same genus, *Manihot dichotoma*, *M. heptaphylla* and *M. piauhyensis*, recently introduced from Brazil, have not yet passed their experimental stage.

"*Kickxia* has been planted in rather large numbers only in the Neulangenburg district, where there are about half a million trees, as well as 30,000 trees of *Castilloa* while in the principal region of rubber-plantations, in the Tanga district, only 10,000 *Castilloa* and 670 *Kickxia* were counted in the year 1908. Neither of these plants has any great future in German East Africa. There is a better future for *Hevea*, which thrives quite well in certain places on the damp alluvial soil of the rivers. Nevertheless, in consequence of two long periods of drought, the climatic conditions are not exactly favourable to its development. According to these results, obtained

especially in Sigital, one may advise, for those plantations on which irrigation is possible, that *Hevea* should be planted between the *Manihot*. If the experiment should succeed, the large gains from *Hevea*-rubber would more than compensate for the loss of the *Manihot*, which would probably be killed off by overshadowing.

"The plantations of rubber-lianes in the Neulangenburg district on Lake Nyassa are also interesting, and appear to be doing quite well. These lianes may be recommended for planting as a subsidiary culture. The species most generally planted here is *Landolphia Stolzii*, a robust liane, which develops well even on dry soil, and in ten years attains a height of 15-20 m. with a stem 20 cm. in circumference. According to Dr. Eduardoff one can now reckon on obtaining 75 grm. of good rubber by tapping once in zig-zag fashion, and this can be done once a month, periods of rest being naturally allowed. In this species young plants give bad rubber, and therefore tapping does not appear to be advisable before the seventh year. The cultivation of the shrubby *Landolphia dondeensis* has also been started, and is perhaps locally promising.

"All the other rubber-plants in East Africa are still in the experimental stage. Among these are *Cryptostegia grandiflora*, *Clitandra kilimandjarica*, *Mascarenhasia elastica*, which does not appear to thrive, and *Ficus Schlechteri*, a tree, which, after several years of cultivation, is only now beginning to increase its rate of growth."

VIII.—THE JAPANESE SPECIES OF CERASTIUM.

H. TAKEDA.

Historical.

Thunberg* was the first botanist to record the Japanese species of the present genus. He enumerates two species, viz. :—*C. vulgatum* and *C. viscosum*. According to Miquel† these two plants of Thunberg do not differ from each other but are *C. vulgatum*, Linn. a *brachypetalum lusus glandulosum*, Fenzl. In 1875 Franchet and Savatier‡ knew *C. glutinosum*, *C. viscosum*, *C. vulgatum* β *glandulosum*, and *C. alpinum* β *Fischerianum*. Meanwhile Maximowicz§ enumerated *C. semidecandrum*, Linn. var. *herbaceo-bracteatum*, Fenzl; *C. vulgatum*, Linn. β *glandulosum*, Koch; *C. vulgatum*, Linn. *lusus hirsutum*, Fenzl; and *C. alpinum*, Linn. β *Fischerianum*, Regel, as natives of Japan. He suggested that the plant figured on fol. 30 of vol. viii. of Sômokû Dzusetsu under the name of "Oyama-fusuma" seemed to be *C. arvense*, Linn., so that Japan would be added to localities of the plant. Franchet and Savatier in the second volume of their Enumeratio published in 1879 made some alterations and additions to their previous knowledge. They considered that the specimen, no. 137, collected by Savatier at Yokosuka and referred to in their work under *C. glutinosum* must be *C. vulgatum* var. *glandulosum*,

* Thunberg, Flora Japon. p. 188 (1784).

† Miquel, Prolus. Fl. Japon. p. 10 (1866).

‡ Franchet et Savatier, Enum. Pl. Japon. i, p. 50 (1875).

§ Maximowicz, in Bull. Acad. Imp. St. Petersb. tom. xviii. pp. 385-386 (1873).

while, following Maximowicz, they added Nagasaki as the locality of *C. glutinosum*, Fries. They were in doubt as to the existence of *C. viscosum* in the Flora of Japan, since this species is not enumerated in Maximowicz's paper, and supposed their specimen might be a glandular form of *C. vulgatum*. They added to *C. vulgatum* another variety, var. *alpinum*, Koch, based on a specimen obtained from Mount Ibuki. Afterwards Maximowicz* published a new species of this genus, called *C. schizopetalum*, from Central Japan, which is very interesting and is distinguished by having regularly 4-lobed petals. In the Flora of the Kurile Islands published a few years later Professor Miyabe† enumerated three species with varieties, viz. :—*C. semidecandrum*, Linn. var. *herbaceo-bracteatum*, Fenzl; *C. vulgatum*, Linn. var. *glandulosum*, Koch; var. *grandiflorum*, Fenzl; *C. alpinum*, Linn. var. *Beerianum*, Regel; var. *Fischerianum*, Torr. et Gray. Of these the author had seen the specimens of the second and the last plants; others were inserted in his paper on the authority of the Russian botanists. In 1898 Williams‡ made a revision of the Japanese species. According to his opinion there are eight species known as Japanese, two of them being new :—*C. schizopetalum*, Maxim.; *C. robustum*, Williams; *C. alpinum* var. *Fischerianum*, Torr. et Gr.; *C. pumilum*, Curtis; *C. Ianthès*, Williams; *C. arvense*, Linn.; *C. triviale*, Link with two varieties namely *typicum*, Will. and *glandulosum*, Koch; and *C. glomeratum*, Thuill. A few years ago another new species, *C. oxalidiflorum*, was added by Makino§ to the Japanese Flora. No specimen of this genus had been collected in the extreme South of Japan, until Dr. Hayata|| reported the occurrence of two species in the island of Formosa :—*C. pilosum*, Led. and *C. morrisonense*, Hayata.

From the results of the labours of these botanists we understand the following species to be reckoned as natives of Japan :—

1. *C. pilosum*, Ledeb.
2. *C. oxalidiflorum*, Makino.
3. *C. triviale*, Link.
var. *typicum*, Williams,
= *C. vulgatum* *lusus hirsutum*, Maxim.
var. *glandulosum*, Koch.
var. *alpinum*, Koch.
var. *grandiflorum*, Fenzl.
4. *C. pumilum*, Curtis,
= *C. glutinosum*, Fr. et Sav.
= *C. semidecandrum*, var. *herbaceo-bracteatum*, Maxim.
5. *C. Ianthès*, Williams.
6. *C. glomeratum*, Thuill.,
= *C. viscosum*, Fr. et Sav.
7. *C. alpinum*, Linn.
var. *Beerianum*, Regel.
var. *Fischerianum*, Regel.

* Maximowicz, in Bull. Acad. Imp. Sc. St. Peters. xxxii. p. 483 (1887).

† Miyabe, Fl. Kuril. in Mem. Boston Soc. Nat. Hist. iv. No. 7, p. 220 (1890).

‡ Williams, in Bull. Herb. Boiss. vii. pp. 129–32 (1899).

§ Makino, in Tôkyô Bot. Mag. xix. p. 102 (1905).

|| Hayata, Fl. Mont. Formos. p. 57 (1908).

8. *C. robustum*, Williams.
9. *C. morrisonense*, Hayata.
10. *C. arvense*, Linn.
11. *C. schizopetalum*, Maxim.

Critical.

Having had the opportunity of examining at Kew most of the original specimens of *Cerastium* from Japan as well as the valuable specimens referred to in the list given above, I have been able to make a careful study of the various Japanese specimens in connection with those of my own collection. Before entering into a detailed account and criticism of each plant, I should like to preface my remarks with a few words as to the characters of systematic importance in the genus. Species of this genus cannot be distinguished by only a few characters. The habit, hairiness of stem, size and shape of leaves, characters of bracts, length and direction of pedicels, proportion of length between sepals and petals, size and shape of petals and direction of capsules, must all be consulted; still they are to some extent not constant. Great care must be paid in examining the direction of the pedicels and capsules; the pressing of the plants often causes them to assume a quite unnatural direction. It is also my conviction that the size and marking of mature seeds afford a very good distinctive character, though the various kinds of marking are rather difficult to describe satisfactorily in words.

Although my studies have been made mainly on the type specimens, I have occasionally been obliged to judge the opinions of previous workers on this subject only from descriptions, as the specimens were not always at my disposal.

According to Dr. Hayata the specimens of *C. pilosum* collected in Formosa are not perfect, so that it is rather difficult to say with certainty whether they really belong to that species.

Though I have not seen the original specimens of *C. ovalidiflorum*, Makino, I can readily decide from the author's precise description that the plant is conspecific with *C. pilosum*, Ledeb.

C. triviale, Link, is one of the most variable plants according to circumstances of habitat. The species is generally biennial or even perennial, though weak annual specimens are often met with. So far as I am aware the Japanese form of this plant, and especially that growing in the central and southern parts of the country, usually has leaves oval in form like those figured in Iwasaki's Honzo Dzufu* and Inuma's Somoku Dzusetsu†, while in North Japan specimens often occur having narrow lanceolate leaves as figured in Vaillants' Botanicon Parisiense‡, Curtis and Hooker's Flora Londinensis,§ and Reichenbach's Icones Florae Germanicae.|| The bracts of the Japanese plant are generally herbaceous, and the primary pair is usually foliaceous. The secondary bracts of the specimens gathered by myself near Nemuro, in the island of

* Id. op. xlviii., fol. 14 verso.

† Id. tab. xxx., fig. 1.

‡ Id. op. viii. fol. 71.

§ Id. op. i., 2, tab. 42

|| Id. op. v.-vi., fig. 4972.

Yezo, are scarious on the margin. As Franchet* states, Japanese specimens are mostly viscid, and I have seen no specimens from Japan without glandular hairs. I have been able to examine the specimens collected by Oldham at Nagasaki in 1862, which Maximowicz took for *C. vulgatum lusus hirsutum*, Fenzl, and which Williams determined as *C. triviale a typicum*, Williams. The specimens, however, show that it is really var. *glandulosum*, Koch and not an eglandular form.

I have not been able to examine the plants which Williams thought to be *C. pumilum*, Curtis, the occurrence of which in Japan is quite doubtful. I doubt whether he really examined the specimens to which he refers under that name. One of these specimens collected by Savatier at Yokosuka and taken by Franchet for *C. glutinosum*, Fries, is, according to the statements of Franchet and Savatier in the second volume of their Enumeratio† said to be a glandular form of *C. triviale*, Link. I suspect, therefore, that the plants recorded as *C. glutinosum* or *C. semidecandrum*, var. *herbaceo-bracteatum*, may be small specimens of *C. triviale* var. *glandulosum*. The petals of this Japanese species are generally a little shorter than the calyx, oblanceolate and $\frac{1}{2}$ -bilobed. The specimens collected by me in the neighbourhood of Nemuro have petals slightly exceeding the calyx in length, obovate-oblong, $\frac{1}{3}$ -bilobed, and often subciliate at the base.

C. Ianthes, Williams, is, so far as I can decide from his original specimen, also a weak form of *C. triviale* var. *glandulosum*, though he places the plant near *C. nutans*, laying stress upon the length of the pedicels and the direction of the capsules. The pedicel of *C. triviale* is filiform and as long as or sometimes 3-4 times as long as the calyx, and the capsules are usually nutant.‡

About *C. glomeratum* I should make some remarks upon Williams' view. He refers to two specimens. The one was collected by Williams and Morrow at Shimoda and the other was gathered by Faurie in the island of Rebunshiri. He refers the Shimoda specimen after Franchet and Savatier, who considered it to be *C. viscosum* in the first volume of their Enumeratio and afterwards in the second volume doubted about it and have said " . . . fortasse ad speciei sequentis (i.e., *C. vulgatum* = *C. triviale*) formam glandulosam referenda." The specimens from Rebunshiri, which Williams himself examined and preserved at Kew are, however, about 25 cm. high, solitary, distantly foliated with oblong, obtuse leaves, bearing a diffuse inflorescence with young flowers. They very much resemble the plant which I collected at some places in Hokkaidô and propose to name *C. boreale*. But as there exists no ripe fruit, the determination is rather conjectural; still so far I am quite sure that the specimens do not represent *C. glomeratum*, Thuill., so that *C. glomeratum* should be excluded from the Flora of Japan.

The plant believed by several botanists to be *C. alpinum* var. *Fischerianum*, is in fact neither the plant of Regel nor that of Torrey and Gray. The species is rather remotely related to

* Franchet et Savatier, Enum. Pl. Japon. ii., p. 295.

† Franchet et Savatier, Enum. Pl. Japon. ii., pp. 294, 295.

C. rigidum, Ledeb., but differs in several points. As it has not yet been described by any botanist I have named it *C. Schmidtianum* in compliment to Fr. Schmidt who studied the flora of Saghalien and noticed the present plant. The specimen collected by Tschonoske in the province of Shinano and referred to as *C. alpinum* var. *Fischerianum* by Maximowicz and Williams is by no means *C. Schmidtianum*, Takeda, but is apparently *C. pilosum*, Ledeb. Maximowicz seems to have confused *C. pilosum* and the plant in question, for the specimens collected near Port St. Olga, Manchuria, and determined by him as *C. alpinum* var. *Fischerianum* are really *C. pilosum*, Ledeb., and not identical with my *C. Schmidtianum*.

C. robustum, Williams is, I think, a good species, though it resembles *C. Schmidtianum* in many respects; it differs, however, from the latter in having elongate lanceolate leaves, more or less attenuated towards the base, with seeds densely muricated. The primary pair of bracts of this plant are herbaceous, the others much smaller and scarious on the margin.

Judging from the description, *C. morrisonense*, Hayata seems to be closely allied to *C. arvense*, from the narrow-leaved form of which this plant is distinguished by having larger flowers with more deeply bilobed petals.

Maximowicz and Williams suppose that plate 30 of Sôroku Dzusesu, vol. viii. represents *C. arvense*, Linn. The plant there figured is however *Moehringia lateriflora*, so that *C. arvense* cannot be reckoned a native of Japan.

C. schizopetalum, Maxim. is a very distinct species with 4-lobed petals. This is distributed in the alpine region of the high mountains of Central Japan.

Consequently the eleven species enumerated above should be reduced to seven. I add to them one new species and another one which is new to the Flora of Japan. The following enumeration comprises all the *Cerastia* known to me at present.

Enumeratio specierum mihi notarum.

1. *C. pilosum*, Ledeb. in Mém. Acad. Sc. St. Petersb. v, p. 539.—Bunge, in Ledeb. Fl. Alt. ii., p. 178.—Fenzl., in Ledeb. Fl. Ross. i., p. 398.—Turcz. Fl. Baic.-Dah. i., p. 240.—Regel, Tentam. Fl. Ussur. no. 95; Pl. Radd. i., p. 427.—Maxim. in Bull. Acad. Imp. Sc. St. Petersb. xviii., p. 385.—Komar. Fl. Ross. ii., p. 181.

Syn. *C. Ledebourianum*, Ser. in DC. Prodr. i., p. 420.

Var. *amurense*, Regel, Pl. Radd. i., p. 428.

Syn. *C. alpinum* var. *Fischerianum*, Maxim. l.c. p. 386, tamen quoad plantam Japonicam nec non pl. ex. St. Olga.—Williams, in Bull. Herb. Boiss. vii. (1899), p. 130, pro parte non Regel nec Torr. et Gr.

C. oxalidiflorum, Makino, in Tôkyô Bot. Mag. xix. (1905), p. 102.

Hab. Alpine pastures, prov. Shinano, Tschonoske, 1864; Mount Morrison? ex B. Hayata.

2. *C. triviale*, Link, Enum. Hort. Berol. i., p. 433.

Var. *glandulosum*, Koch, Syn. Fl. Germ. et Helv. ed. 1., p. 122, ed. 2, p. 134.—Williams, l.c. p. 132.

Syn. *C. vulgatum*, Thunb., Fl. Japon. p. 188.

C. vulgatum a brachypetalum Lus. glandulosum, Fenzl, l.c. p. 408.
—Miq. Prol. Fl. Japon. p. 10.—Frauch. et Sav. Enum. Pl. Japon. i., p. 50, ii., p. 295.

C. vulgatum β glandulosum, Regel, Pl. Radd. i., p. 432.—Maxim. l.c. p. 386.

C. vulgatum Lus. hirsutum, Maxim., l.c. nec Fenzl (fide spec. in herb. Kew.).

C. viscosum, Thunb., l.c.

C. triviale a typicum, Williams, l.c. p. 131 (fide spec. in herb. Kew.).

C. pumilum, Williams, l.c. p. 131, nec Curtis (fide spec. original. in herb. Kew.).

C. Ianthes, Williams, l.c. p. 131 (fide spec. original.).

Hab. Satporo, *Faurie*, 3. vi. 1887, no. 340, *K. Miyabe* et *Y. Tokubuchi*, 26. v. 1890; circa Hakodate, *Albrecht*, 1861; Sambongi, *Faurie*, 9. vi. 1886, no. 586; Tôkyô, *H. Takeda*, 21, v. 1902; *T. Terasaki*, v. 1906; Nagasaki, *Oldham*, 1862, no. 487; Yokohama, *J. Bisset*, v. 1876, no. 51; Japan, *Dickins*, x. 1881; *C. Wright*, 1853-56.

3. *C. rigidulum*, *Takeda*, sp. nov.

Species *C. unalaschkensi*, *Takeda*, affinis, sed planta humiliore, sepalis brevioribus, petalis calycem non superantibus basi glabris, seminibus minoribus ad marginem non echinatis distinguitur.

Perenne; caulis fere pedalis, crassus, a basi ramosus, geniculatus, ferrugineo-pubescent, in parte superiore pilis glanduliferis immixtis. *Folia* crassiuscula, basilaria obovata basin versus attenuata, inferiora oblonga, media superioraque ovata vel oblongo-ovata, acutiuscula, pilis eglandulosis dense obsita. *Dichasium* 3-5-florum; pedicelli crassi, rigidi, centrales fructiferi erecto-patentes vel suberecti, apice vix incurvi, calyce fere triplo longiores; bracteae infimae foliaceae, omnes herbaceae. *Sepala* 8 mm. longa, lanceolata, acuta, margine scariosa, apice biloba, dorso glanduloso-pubescentia. *Petala* oblanceolato-oblonga, fere 8 mm. longa, apice lobis angustis acutis in $\frac{1}{4}$ parte biloba, basi glabra. *Capsula* late cylindracea, recta, apice vix curvata, calyce duplo longior, dentibus rectis obtusis. *Semina* matura triangulato-oblonga, compressa, ferruginea, tuberculata, 1.2 mm. longa.

KURILE ISLANDS. ins. Shikotan: in port. Shakotan, *H. Takeda*, vii. 1909.

4. *C. boreale*, *Takeda*, sp. nov.

A. *C. triviale*, Link, cui remote affine, floribus majoribus, pedicellis crassioribus, seminibus majoribus oblongo-globosis nec triangulari-globosis tuberculis magis prominentibus distinguitur.

Caulis caespitosus, 15-30 cm. altus, erectus, simplex, basi divisus, modice pubescens, pilis reflexo-patentibus eglandulosis vestitus, in parte superiore pilis glandulosis immixtis. *Folia* inferiora oblongo-obovata, basin versus attenuata, superiora ovata, acuta, basi sessilia. omnia uninervia, hirsuto-pubescentia. *Dichasium* 3-7-florum; rami longe pedunculati; pedicelli fructiferi calyce triplo longiores, patuli, apice nutanti, pubescentes, pilis glanduligeris immixtis; bracteae anguste ovatae, acutae. *Sepala* lanceolata, acuta, late

scariosa, parte herbaceo glanduloso-pubescenti, 7 mm. longa. *Petala* elliptico-oblongeolata, calycem ad $\frac{1}{3}$ superantia, ad 1 cm. longa, leviter biloba, lobis anguste ovatis acutiusculis, basi glabra. *Capsula* calyce duplo longior, apicem versus leviter curviuscula, dentibus rectis obtusis. *Semina* oblongo-globosa, compressa, ferruginea, tuberculata.

Syn. *C. glomeratum*, Williams, l.c. p. 132, nec Thuill.

a scariosum; bracteis superioribus margine scariosis.

JAPAN. Yezo: Tumoshiri prope Nemuro, *H. Takeda* 12. vii. 1909; Rebunshiri, *Faurie*, no. 7286.

β *herbaceo-bracteatum*; bracteis omnibus herbaceis.

KURILE ISLANDS. ins. Shikotan: Anama, *H. Takeda*, vii. 1909.

5. *C. Schmidtianum* Takeda, sp. nov.

Speciei praecedenti quoad staturam similis, sed ab ea caule robustiore, dichasio multifloro, petalis majoribus obovatis profunde bifidis nec oblanceolatis leviter bilobis, nec non foliorum forma distinguitur. Species etiam *C. rigido*, Ledeb., remote affinis, sed caule crassiore, foliis ovatis vel late ovatis nec basin versus attenuatis crassioribus, pedicellis centralibus patulis nec erectis, sepalis longioribus acutioribusque, petalis staminibusque non ciliatis, seminibus distantius tuberculatis differt.

Perenne; caulis basi divisus, adscendens, geniculatus, robustus, ad 40 cm. altus, subsimplex, inferne pilis reversis eglandulosis, superne pilis glandulosis dense obsitus. *Folia* inferiora oblongo-obovata, obtusa, media oblongo-lanceolata, acutata, superiora remota, ovata vel late ovata, acuta, basi dilatata, saepe subamplexicaulia, omnia pilis brevibus rigidis pubescentia, saepe glanduloso-ciliata. *Dichasium* plerumque multiflorum, demum diffusum, ramis longe pedunculatis, viscidis; pedicelli crassi viscidi, centrales fructiferi erecto-patentes vel subdeflexi, apice subnutantes, calycem duplo vel ultra superantes; bractee infimae foliaceae, supremae margine anguste scariosae, omnes viscidae. *Sepala* oblongo-lanceolata, acutiuscula, margine scariosa, dorso dense viscida, 6.5-7 mm. longa. *Petala* calyce subduplo longiora, obovato-cuneata, apice triente bifida, lobis obtusis, basi glabra. *Capsula* calyce duplo longior, conico-cylindracea, recta vel paulo curviuscula, dentibus rectis, obtusis. *Semina* oblongo-globosa, compressa, fusco-ferruginea, tuberculata, paulo ultra 1 mm. longa.

Syn. *C. Fischerianum*, A. Gray in Parry's Expedition, ii, p. 309.—Fr. Schm. Reis. Amurl. Sachal. p. 118, excl. syn. nec Sér.

C. alpinum var. *Fischerianum*, Fr. et Sav. l.c. i. p. 50, excl. syn. non Regel.—Maxim. l.c. pro parte tamen quoad pl. Japon. sachalinensemque, excl. syn. non Rgl.—Williams, l.c. p. 130, pro parte, excl. syn. nec Torr. et Gr.

JAPAN (probabiliter Yezo), *C. Wright*, 1853-56: *Harland*, no. 655; *Hakodate*, *C. P. Hodgson*, 1860; *Albrecht*, 1861; *R. Yatabe*, vii. 1878, *Faurie*, 160 (18. v. 1887); *K. Miyabe* et *Y. Tokubuchi*, 9. vii. 1890; Toyohira near Satporo, *S. Itô*, 5. vii. 1905; Satporo, in hort. bot. ex prov. Hidaka cult., *H. Takeda*, 24. vi. 1906; Saghalien, *Fr. Schmidt*; Mauka, Saghalien, *T. Miyake*, 3. vii. 1906.

6. *C. robustum*, Williams, l.c. p. 129.

JAPAN. Yangeshiri island, rocky places, *Faurie*, 7165 (29. vii. 1891).

7. *C. ciliatum*, Turcz., Fl. Bac.-Dah. i., p. 245.

Perenne; caulis caespitosus, 10-30 cm. vulgo 20 cm. altus, erectus, gracilis, simplex, basi divisus, medio glabrescens, linea 1 notatus, in parte suprema pubescens, pilis glandulosis patentibus brevibus densiuscule vestitus, saepe post anthesin elongatus et distanter foliatus. *Folia* caulina infima obovato-spathulata, basin versus attenuata, media et superiora lanceolata vel late lanceolata, sessilia, apiculata, acuta, uninervia, glabrescentia, saepius ciliata; turiones elongati, foliis basilaribus spathulatis supra pilosis ciliatisque, superioribus glabrescentibus ciliatis. *Dichasium* 3-9-florum; pedicelli centrales fructiferi erecto-patentes, apice plus minusve curvati, calycem 4-5-plo superantes, glanduloso-pubescentes; bractee infimae plerumque foliaceae, ciliatae, superiores minores, late lanceolatae, margine membranaceae, in nervis puberulae, acutae. *Sepala* fere 5 mm. longa, elliptico-lanceolata, obtusa, apice plerumque leviter bifida, puberula, margine late-scariosa, saepius apicem versus atro-purpurea. *Petala* obovato-cuneata, basin versus valde attenuata, profunde in $\frac{1}{3}$ bifida, lobis ellipticis rotundatis, calyce duplo longiora, ungue glabra. *Capsula* calycem subduplo superans, conico-cylindracea, recta, dentibus rectis obtusis. *Semina* matura compresso-globosa, ferruginea, 1 mm. diametro, leviuscula, sub lente leviter rugulosa.

Syn. *C. vulgatum* var. *ciliatum*, Fenzl, l.c. i., p. 410.

C. alpinum β *Fischerianum* Lus. *ciliatum*, Regel, Pl. Radd. i., p. 439.

JAPAN. Mt. Shirouma, alpine region, 10,000 ft., *H. Takeda*, viii. 1905.

The occurrence of this plant which is distributed in the Altai district and in Transbaicalia, Siberia, is highly interesting. It differs from *C. alpinum*, and especially from its narrow-leaved form, in being less hairy in all parts and in having smaller flowers and shorter pods as well as in the shape and marking of the seed. Our plant is also different from *C. glabratum* in its pubescent, shorter, obtuse sepals, ciliated leaves, and the nearly smooth seed. Fenzl united this species with *C. vulgatum*, but the plant described may be distinguished from *C. vulgatum* in having petals twice as long as the obtuse sepals, larger seeds which are compressed globose and indistinctly marked.

8. *C. morrisonense*, Hayata, Fl. Mont. Formos. p. 57.

JAPAN. In montibus Morrison, sec. *B. Hayata*.

9. *C. schizopetalum*, Maxim., in Bull. Acad. Imp. Sc. St. Petersb. xxxii. p. 483.—Williams, l.c. p. 129.

JAPAN. In montibus Yatsugatake, *H. Takeda*, vii. 1903; in monte Komagatake, prov. Kai, *H. Takeda*, viii. 1903, viii. 1906; in monte Shôdzû, prov. Etchû, *H. Takeda*, viii. 1905; ad fl. Akagawara superior., prov. Shinano, *H. Takeda*, vii. 1907.

Plants unknown to me.

Specimens of the following plants which have been recorded in the Flora of Japan have not been at my disposal, so that I do not attempt to discuss them in this paper.

1. *C. vulgatum* var. *alpinum*, Fr. et Sav., Enum. Pl. Japon. ii., p. 239.

2. *C. vulgatum* var. *grandiflorum*, Maxim. in Miyabe, Fl. Kuril. p. 220.

3. *C. alpinum* var. *Beerlingianum* lus. *flavescens*, Regel, Pl. Radd. i., p. 438.—Miyabe, l.c.

Clavis Specierum mihi Notarum.

The following key is based principally on characters of pedicels, sepals, petals, and leaves, &c. Characters of capsules and seeds are possibly not consulted, as they are not always to be had in herbarium specimens.

1. Petalis obovato-cuneatis apice integris interdum cuneatis, basi staminibusque ciliatis, sepalum obtusum 2-3-plo superantibus. Planta elata, pilosa, foliis tenuibus basin versus attenuatis

1. *C. pilosum*, Ledeb., var. *amurense*, Regel.

Petalis apice bifidis bilobis vel quadrilobis ... 2

2. Petalis oblanceolatis calyce maximo $1\frac{1}{3}$ -plo longioribus 3
Petalis obovato-cuneatis calyce minimo subduplo longioribus ... 5

3. Sepalis 6 mm. non excedentibus vulgo 4-5 mm. longis. Seminibus $\frac{3}{4}$ mm. longis triangulari-globosis granulato-tuberculatis, pedicellis filiformibus, petalis calyce brevioribus aequilongis vel calycem paulo longioribus basi interdum subciliatis. Planta tenuis, glandulosa

2. *C. triviale*, Link, var. *glandulosum*, Koch.

Sepalis 7-8 mm. longis. Seminibus 1 mm. longis vel paulo ultra tuberculatis; pedicellis crassis rigidis ... 4

4. Petalis calycem aequantibus. Seminibus subtriangulari-globosis $1\frac{1}{6}$ mm. longis, pedicellis rigidis apice vix incurvis. Planta crassa, geniculata, ferrugineo-pilosa, foliis ovatis acutis nec distante dispositis

3. *C. rigidulum*, Takeda.

Petalis calycem $\frac{1}{3}$ superantibus. Seminibus oblongo-globosis 1 mm. longis, pedicellis erecto-patentibus apice incurvis. Planta viridula, foliis superioribus distantibus

4. *C. boreale*, Takeda.

5. Petalis bilobis ... 6
Petalis cuneato-obovatis triente quadrilobis. Planta alpica, ad pedalis, tenuis, viscida, foliis lineari-lanceolatis

9. *C. schizopetalum*, Maxim.

6. Planta robusta, foliis late lanceolatis vel late ovatis ultra 3 cm. longis ... 7
Planta caespitosa foliis lanceolatis vel lineari-lanceolatis longitudine 3 cm. non excedentibus ... 8



Japanese species of *Cerastium*.

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To face page 109.]

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7. Foliis superioribus distantibus ovatis late obovatisve basi dilatatis, dichasio laxo, pedicellis subdeflexibus apice incurvis, seminibus 1 mm. diametro laxe tuberculatis. Planta in parte superiore viscida

5. *C. Schmidtianum*, Takeda.

Foliis late lanceolatis, inferioribus ad 7 cm. longis, basin versus subattenuatis, dichasio subcompacto, pedicellis apice paulo tantum curvatis, seminibus $1\frac{1}{3}$ mm. longis densissime elevato-tuberculatis.

6. *C. robustum*, Williams.

8. Sepalis circa 5 mm. longis obtusis leviter bilobis. Petalis 1 cm. non excedentibus triente bifidis. Foliis lanceolatis minimis 3 mm. latis glabrescentibus ciliatis. Planta alpicola, glabrescens 7. *C. ciliatum*, Turcz.
Sepalis 7.5 mm. longis lanceolatis, petalis ultra 1 cm. longis dimidio bifidis. Foliis lineari-lanceolatis infra 3 mm. latis 8. *C. morrisonense*, Hayata.

EXPLANATION OF PLATE.

- Figs. 1-5. *C. boreale*, Takeda.
" 6-9. *C. Schmidtianum*, Takeda.
Fig. 10. *C. rigidulum*, Takeda.
" 11. *C. robustum*, Williams.
Figs. 12-16. *C. ciliatum*, Turcz.

All seeds are magnified 18 times, except Fig. 17 which is 12 times. Other figures are enlarged five times natural size. Sepals are seen from inside.

IX.—THE BEECHWOOD INDUSTRY OF THE CHILTERNs.

W. DALLIMORE.

A good illustration of the way in which large industries may be established and towns built up through the presence of woodlands, from which a continuous supply of wood can be drawn, is to be seen in the Chiltern district. Here, dotted about in Buckinghamshire, Hertfordshire and some of the adjoining counties, there are several towns owing their existence almost entirely to wood-working trades which originated in connection with, and still owe much of their prosperity to the numerous woods in their respective neighbourhoods.

The beech, being the dominant tree of the Chilterns, enters largely into the various manufactures and the wood has long been a source of revenue to estate owners in the locality; for timber grown on the heavy soil, overlying chalk, which is peculiar to the country, has acquired a reputation for strength and durability which is unsurpassed.

A tour through the district reveals the fact, that while a considerable area is covered by beech woods, there are no very extensive plantations, the object apparently being to restrict tree growth to the positions least suitable for agricultural purposes and

to form long shelter belts for farm land. Thus, in many instances, whilst the crests and the higher slopes of hills are given over to timber, the lower slopes and valleys are in the hands of the farmer. Where, however, the lower and more sheltered ground is given up to beech, a remarkable difference is noticeable in the girth of the trees. A few trees of other kinds grow among the beech; the most common being oak, cherry, ash and hornbeam.

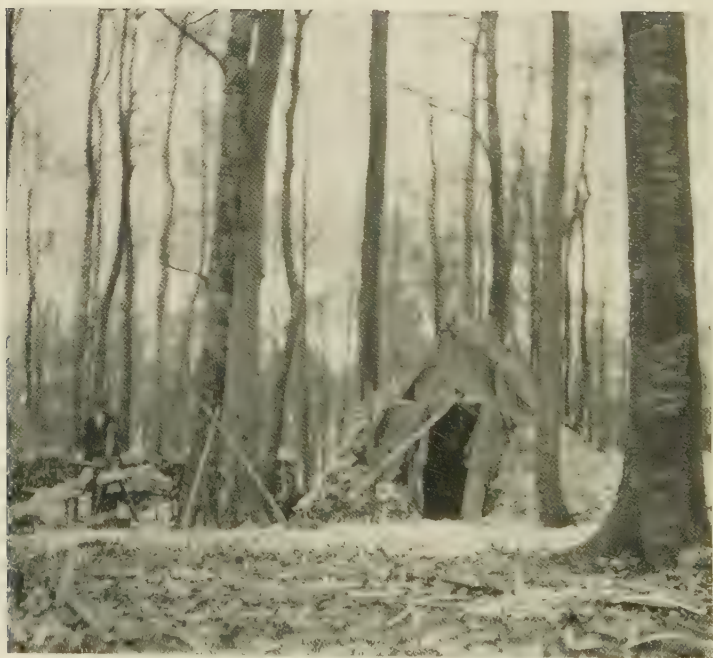
The general system with regard to felling, is to go through each wood periodically and remove a certain number of the large trees, together with badly placed trees. Gaps, so caused, are filled up by natural regeneration which is thus constantly in progress. Occasionally, however, a clear felling is made and, in such cases, larch usually forms the succeeding crop. No great quantity of beech appears to be planted, though now and then a mixture of larch and beech may be noted.

Difficulties arise when attempting to arrive at a satisfactory conclusion regarding the approximate value of beech timber in the Chilterns, for so many questions have to be considered which have either a favourable or adverse bearing on the question of price, that ninepence a cubic foot obtained in one place may be considered quite as satisfactory as eighteenpence a cubic foot elsewhere. The size and condition of the timber are of course the first considerations in determining the price, but such items as whether the timber is sold standing or felled; its distance from a good road and manufacturing centre, and whether it can be partly worked on the ground, are all subjects which help to determine its value.

Trees of small girth are sometimes well sold at from sixpence to ninepence a cubic foot, while trees with a large quarter girth have been known to reach half-a-crown a cubic foot in the neighbourhood of Chesham. The most frequent price for medium sized, clean grown trees would appear to be from one shilling to one shilling and sixpence a cubic foot.

Of the several towns where an outlet is found for beech timber, High Wycombe is perhaps the most important. As a centre for chair-making it is of world-wide fame, whilst general cabinet work and numerous minor industries are also established there. Beech timber enters largely into these various industries, and it is of special importance in the manufacture of chairs, though of late years a rival has sprung up in imported birch which arrives partly worked. Windsor chairs, with the exception of the seats, are made of beech, and many of the commoner upholstered chairs are also made from the same kind of wood.

Formerly, a considerable amount of work in preparing the wood for chair-making, such as the turning of legs, spindles, &c., was carried out in the woods; the articles being put together in factories and shops in the surrounding towns and villages. Men from these places found work in the woods for the greater part of the year, and in some cases bothies were erected for the accommodation of those men whose homes were too far distant to allow of their return each evening. For some years past, however, this practice has been gradually dying out, for the competition with machine-made articles and imported wood, already partly worked,



CHAIR-LEG INDUSTRY, GREAT HAMPDEN WOODS.

has made it increasingly difficult for men working under the old conditions to earn an adequate means of livelihood. The practice, however, still obtains in a few places, and through the courtesy of the Earl of Buckinghamshire and his agent Mr. A. G. Hobart-Hampden, some particulars of the work were gleaned in the woods at Great Hampden during January.

The system is in vogue for local tradesmen to purchase a certain number of standing trees. They then send men into the woods whose business it is to cut the trees down and work them into legs and spindles of specified sizes. The wood is worked while quite green, for as soon as a tree is felled, it is cut up into 14, 16, or 18 inch lengths as required. These pieces are then split down the middle and quartered. Each quarter is again split, this time radially into sectors, each containing sufficient wood for three legs or spindles. A sector forms roughly an equilateral triangle, the base being wide enough for two legs and the apex for one leg. From a section of a trunk 12 to 13 inches in diameter, it is possible to obtain about two dozen legs, but if the wood were sawn instead of being split, it is probable that more could be made. The radial splitting of the wood is a matter of prime importance, for if it were split in any other way, the legs would be weak and liable to fracture. The rough pieces of wood, after being trimmed into shape with an axe, are turned and finished off by means of a primitive pole lathe installed in a quaint little thatched hut or 'shop.'

The lathe consists of an ordinary bed and mandrels, the power being obtained by means of an inclined, flexible pole, a thin rope and a treadle. One end of the pole, which may be from 12 to 15 feet long, is firmly secured outside the hut at a height of about 2 feet above the ground. The other end passes into the hut and in doing so rises, so that at the lathe it is several feet above the worker's head. To this end a loose rope is secured, the other end of the rope being passed between the bed and the rest of the machine and made fast to the treadle near the ground. In placing the object to be turned in position between the mandrels it is encircled by a turn of the rope. By using the treadle the object is made to revolve, first forwards as the pole descends, then backwards as it flies back into position. During the forward movement, the working tool is brought to bear on the chair leg or whatever is being turned, and in a very short space of time the article is removed in a finished state. The accompanying illustrations taken in the Great Hampden woods show the thatched huts packed round with wood shavings, the long lathe-pole passing into the hut and the rough timber for the chair-legs lying around.

Trees from medium to small girth are preferred to large trees for the purpose, and clean grown timber is necessary. From 9 to 12 dozen legs can be made by a man and a strong youth in a day, providing their timber is ready cut. When the legs leave the lathe they have a fine, smooth surface, and are taken without any further work and piled up in the open for partial seasoning in readiness for removal to a factory where the seasoning is completed.

Though men are employed at this work almost the year round, the result of their labours goes a very little way towards satisfying the demands of the Wycombe manufacturers, for it is said that

upwards of 2,000,000 chairs are made in the town annually. The method of working up the timber in the woods strikes one as being more wasteful than methods which obtain in factories; for, in the former case, not only does loss occur in splitting in place of sawing, but also the workers are unable to use up any timber which is inclined to be rough and which, on the other hand, might be converted into small articles of one description or another in a factory.

The question of turning the waste material into acetone has been considered, but owing to the lack of a large and constant supply and the low price offered, it would not be likely to prove a financial success.

As the town of High Wycombe is famous for its chairs, so Chesham is renowned for its brushes. The town contains a number of factories which expend the whole or the greater part of their energy on the manufacture of brushes. Though beech is not the only wood used in the brush-making trade, it is the most important, for no other wood has been found to answer so well for the blocks into which the hair or fibre is secured. These blocks have, of necessity, to be pierced by a large number of holes and very few woods are found which will stand the boring and subsequent wiring of the bunches of hair or fibre into position, so well as the beech. For large bass brooms and a few other kinds of similar construction, where the holes are comparatively few in number and the blocks thick, preference is given to birch on the question of lightness, but for all the smaller and denser kinds of brushes such as scrubbing brushes, clothes brushes, boot brushes, hair brushes, dandy brushes, &c., beech is invariably chosen. The majority of the smaller brushes are finished off with a back of some other kind of wood. These backs are sometimes attached directly to the block with its filling of hairs or fibre and wire, or there may be a thin veneer between the two. The kind of wood used for the backs differs in the various kinds of brushes. For scrubbing brushes, horse chestnut is most in favour on account of its whiteness, and makers state that brushes backed with this kind of wood find a more ready sale than those backed with woods which are less clean looking.

In the case of brushes with polished backs and handles, a wider range of woods may be used. Those with a little figure are preferred though figure is not of great moment. Cherry, sweet-chestnut, walnut, birch, &c., in addition to several foreign woods, are used.

Some idea of the importance of the brush business to Chesham may be gathered from the fact that one factory alone, which is engaged solely in the manufacture of brushes, finds regular employment for upwards of 150 men and women. By the kindness of Messrs. R. Webb and Sons I was enabled to see the whole process of up-to-date brush manufacture, and I am indebted to them for much information on the uses of beech and other timber.

Important as the brush-making industry is in the town, Chesham woodworkers find many other outlets for their talents, for there are numerous factories which manufacture a great variety of articles. Thus, in one factory visited, the owner had gained a reputation for malt shovels or barn shovels as they are variously called. These large, wide-mouthed shovels are shaped out of single pieces of wood.

Only trees which possess a large quarter girth are available for the purpose, for a shovel made from a plank taken from the centre of a tree would split easily and be of no value, therefore each shovel is sawn from a radial section of a quarter of the girth of a tree. These sections are then shaped, partly by hand and partly by machinery, and placed in an airy building to season. Colour has a bearing on the sale, consequently the shovels are smoked to a brownish colour before being delivered to dealers. Other woods, particularly poplar, are used for shovel-making, but they are less esteemed than beech. When shaping shovel handles, a good sized piece of wood is taken from each side; these are all utilized, for they are cut up into toy spades, cheap cricket bats, handles for toy tennis rackets, &c.

The manufacture of playthings from beech forms an extensive business. Hoops, and spades for the seaside, alone give employment to large numbers of men for many months of the year. Wood for hoops is cut into long thin laths the width of two hoops. The laths are planed and then seasoned; afterwards they are steamed and, while hot, bent into the required shape and placed in a mould until dry. Two laths are nailed together and the circle of wood is afterwards sawn through the middle to form two hoops. Spades, bats, handles of various descriptions, small household necessities, heels for boots and shoes, spoons and various other articles are cut out of wood which is too small for shovels and other large articles, the wood being worked up to the smallest possible piece. Refuse is also made use of, for it is used as fuel to generate steam for the engines.

Boards cut from radial sections of the wood are used largely for panelling, either alone or as a base for veneer. Sections of large trees are brought into use in the manufacture of certain machines used in cloth mills, whilst spindles and shuttles required in the spinning of cotton are often made from beech. The same kind of wood is esteemed for butcher's trays, the heads of golf clubs, lasts for boots and shoes, and many other articles.

Beech is not used much by the builder but the handles of many of his smaller tools are made from it, and I was informed by a master builder a short time ago, that for stone-mason's mallets, no wood stands hard wear so well as beech, providing it is cut correctly.

Two kinds of beech wood have been described, "red" or "male beech" and "white" or "female beech." The difference is, that one is red in colour, the other white. Red beech is most highly esteemed, though its reputed value exists more in the imagination than in reality, for the so-called "red beech" is simply the steamed wood of an ordinary tree.

In addition to the towns referred to, there are others such as Berkhamsted and Watford which include wood-working among their industries, while in some of the larger villages throughout the Chiltern district, small factories and workshops are to be found.

It is hoped that a series of articles representing the application of beech and other British grown timbers, will be obtained in the near future for the Forestry Museum at Kew.

EXPLANATION OF PLATES.

Fig. 1. Two thatched huts or 'shops' in the woods at Great Hampden. The lathe poles can be seen passing into the huts. A large heap of waste split wood occupies the middle of the picture and between it and the further hut there is a stack of wood split ready for turning.

Fig. 2. A front view of a thatched hut; shavings and wood chips are piled against the hut and cover the ground. The lathe pole is attached to an upright post in front of the hut and passes over the entrance into the hut; on the left a workman is splitting the logs into sectors. A stack of split wood ready to be turned may be seen at the back of the tree near the hut.

X.—MALLET BARK.

(*Eucalyptus occidentalis*, Endl., var. *astringens*, Maiden.)

Mallet Bark is one of the more important of the many tanning materials that have appeared in European commerce during recent years, and though considerable doubt existed for a time as to its botanical origin, its value as a tanning agent was readily recognised.

The early history of the commerce in this bark, which is a product of Western Australia, is given by Mr. E. M. Holmes in the *Pharmaceutical Journal*, February 4th, 1905, p. 141, under the name of *Eucalyptus occidentalis*, the name having been determined from flowering specimens of the plant received from a correspondent in Albany, Western Australia.

In the article referred to, the writer draws attention to the fact that some of the commercial bark is evidently derived from another species of *Eucalyptus*, an opinion confirmed by Mr. Maiden in the communication printed below.

Mr. Holmes, quoting from *Der Gerber*, xxx. December 15th, 1904, indicates that the following percentages of tannin available for leather manufacture are contained in the bark, viz., young bark 35 per cent.; medium bark 40 to 50 per cent.; old bark 39 to 70 per cent., giving an average of about 38 per cent. A specimen of the powdered bark analysed by Professor H. R. Procter gave tanning matter absorbed by hide 54.5 per cent.; soluble non-tanning matter 8 per cent., matter insoluble in water at 15° C., 25.3 per cent., and 11.6 per cent. water. The tintometer colour measurement of solution containing 0.5 per cent. of tanning matter in 1 cm. cell is given as red 3:0, yellow 8:6. Procter adds that there is no question that "it is one of the strongest natural tanning materials we have had through our hands."

The tanning matter when extracted has a cinnamon-brown colour. It is said to act quickly and easily, and to tan fully. But there appears to be some doubt as to the best method of using it, since

one Australian tanner states that it requires to be used like Valonia in conjunction with other tanning materials, for if used alone it makes a hard thin leather that becomes very brittle. The fact, however, that the demand for the bark has increased so rapidly since its introduction indicates that if used in proper proportions and under suitable conditions it is a valuable tanning material, at least to those who know how to use it. As the bark is easily powdered and the powder easily exhausted of its tannin by cold water, and the leather produced by it is of a pale colour, it evidently possesses considerable advantages, and if it can be produced at a cheaper rate than Mimosa bark, may become a strong competitor of that widely used product.

Mr. J. H. MAIDEN, Government Botanist of New South Wales, has kindly furnished the following particulars about Mallet Bark. He is of opinion that the tree which yields this product is a variety of *Eucalyptus occidentalis*, Endl., to which he has given the name *astringens*, Maiden :—

This has been a well-known article of commerce for the last six years at least, and as there has been some doubt as to its botanical origin, I spent a good deal of time during my botanical journeys in Western Australia (September–December, 1909), in endeavouring to clear up the matter.

The ordinary “Flat-topped Yate” is, in my view, typical *Eucalyptus occidentalis*, Endl. It is a tree with black hard bark for the lower half of the trunk, while the upper half of the bark is black and feathery, the loose bark quivering in the wind strongly reminding one of the feathers of a French fowl. The branches are more or less smooth or ribbony. The bark of this form has no commercial value.

The Mallet is a smooth barked Eucalypt—a Gum in Australian parlance. It also is more or less flat-topped, but quite distinct in appearance to the ordinary flat-topped Yate. No bushmen that I consulted would ever allow that the trees are the same.

I have described the Mallet as a variety (*astringens*), in the Journal Nat. Hist. and Science Soc. of Western Australia, 1910.

The ordinary Yate is *E. cornuta*, Labill. “The tops of a very high species of Eucalyptus which they (the natives) call Mallert” (Jas. Drummond in Hooker’s Lond. Journal Bot.). This is the first instance I can find of the use of the name, which is always now called “Mallet,” although one hears of other spellings, *e.g.*, “Mallat.”

The commercial Mallet trees occur in a north and south strip of the South Eastern part of the State, practically following the Great Southern Railway from Beverley or Brookton to Mount Barker, and at a distance of about 40 miles on either side of the line. It is now prohibited by the Forest Department to cut Mallet Bark from any portion of the area 20 miles each side of the Great Southern Railway. It can be legally stripped from 1st March to 1st November.

The Acting Inspector-General of Forests informs me that the industry has fallen off during recent years, owing to the Mallet

within payable cartage of the Great Southern Railway Line having been cut out. The quantity of bark exported has fallen off from 318,315 cwts. in 1905 to 226,399 cwts. in 1908.

The truck loads of Mallet Bark at so many stations on the Great Southern Railway are a feature which serves to impress the magnitude of the industry on the memory.

In Western Australian commerce there are two recognised kinds of Mallet Bark, viz. :—

(a.) Brown Mallet (commercially the more valuable).

(b.) White Mallet.

There is a "Spotted Mallet," of which only five tons have been handled by a large firm especially interested in this trade (Messrs. Henry Wills & Co., of Albany), and this kind may be dismissed from notice for the present.

Stained inferior pieces known as Black Mallet are sometimes disposed of under a different brand and name. Sometimes "White Gum" bark (*E. redunca* and other species) is mixed by the strippers as an adulterant or unintentionally.

The pieces or strips are sent in by strippers in lengths of about 3 feet, and commonly 6 inches wide.

Brown Mallet.—This is the better variety and usually contains exudations of a brownish friable kino, which is quite evident to the eye, and a fracture discloses such. Externally it is whitish (brown stained) with greyish blotches. It would be classed by bushmen as a "White Gum."

I studied the Brown Mallet trees in the bush in several districts, and following are notes made by me on the spot in two of them.

Narrogin.—Erect in habit, both as regards trunk and branches. Flat-topped liked a broom or brush.

Grows on rises or ridges, not on swamps or flats; therefore only in patches and not in large continuous areas. Grows on ironstone gravel and not on alluvial. Mr. J. H. Gregory (the local District Forester) has often seen Mallet 2 ft. 6 ins. in diameter. He has seen 10 to 15 bundles of bark from one tree, the weight of bark being usually 50-70 lbs. per bundle dry.

It may attain a diameter of several feet, but trees of such size have been destroyed in accessible places. It forms a dense almost impenetrable thicket of young saplings, and it seems to me that it would handsomely pay to thin out such saplings scientifically.

2. Near the Kalagan River bridge, Albany, Porongorups, to Stirling Range (near a sandstone cliff) we came across some Mallets which were being stripped for their bark. The trees are small, say 9 inches to 1 foot (I am informed there were some 18 inches). Bark perfectly smooth, dark and glossy. Underneath the bark is a layer of kino uniformly distributed. This is the Brown Mallet.

White Mallet.—Through the kindness of Messrs. Wills & Co., I obtained commercial samples of the White Mallet. This bark has a pinkish fracture and little or no kino. It is a "cleaner" bark than the Brown Mallet; that is to say, a white, smooth bark with few stains of any kind.

Mr. J. H. Gregory described the White Mallet tree to me as more straggly than Brown Mallet. He says it is like a White Gum (*E. redunca*), and that one locality is 20 miles from Narrogin (near the Williams River).

To me it was a "Will o' the Wisp." Any White Mallet trees shown to me were similar to Brown Mallots, and I travelled many a mile after the White Mallet. Brown Mallots I felled myself and took herbarium specimens from them, but it remains to be proved if the White Mallet differs botanically from the Brown one.

Mallet Bark is chiefly shipped to the continent of Europe (largely, perhaps mainly) from Albany, and principally to Hamburg and Antwerp. For these two markets it is sent in sacks, broken or crushed into pieces about 2 inches long.

There is a smaller market for it in the Eastern States, principally New South Wales and Victoria, and for those markets it is shipped in powder.

For shipment from Albany it comes from Tambellup, Katanning, and even more northern stations.

The price of Mallet Bark was £4 15s. a ton on the trucks in 1909. Broome Hill seems a very active centre for it, in fact the local police say it is *the* centre.

The following are some bibliographical references to Mallet Bark:—

1. "Source of the new bark industry *Eucalyptus occidentalis*, the Flat-topped Yate"; by Dr. A. Morrison, *Journ. Agric. W. Australia*, September, 1904, p. 177.
[This is Mallet, which is a flat-topped tree. "Flat-topped Yate" is *E. occidentalis*, *normalis*, J. H. M.]
2. "Mallet Bark," by E. M. Holmes, *Pharm. Journ.* 4th February, 1905, p. 141.
3. "Mallet Bark," by T. R. Sim, *Natal Agric. Journ. and Mining Record*, March 24th, 1905, vol. viii., no. 3, p. 209.
4. "An investigation of the barks of four West Australian species of *Eucalyptus*," by Henry G. Smith, *Journ. Agric. W. Australia*, 20th April, 1905, p. 219.
5. "Mallet Eucalypt Bark better than Black Wattle," by D. E. Hutchins, *Agric. Journ. Cape of Good Hope*, June, 1905, p. 784.

XI.—MISCELLANEOUS NOTES.

FOREMEN AND STOREKEEPER.—The Lords Commissioners of His Majesty's Treasury have sanctioned, on the recommendation of the Board of Agriculture and Fisheries, the transfer of the Foremen and Storekeeper in the Royal Botanic Gardens from the temporary to the established staff, and Civil Service certificates have been issued for Messrs. G. Dear, W. Irving, C. P. Raffill, A. Osborn, T. W. Taylor and J. Coutts.

Mr. HAROLD GREEN, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Superintendent of the Botanical and Forestry Department, Hong Kong.

Mr. HARRY DODD, whose appointment as Curator of the Botanic Station at Onitsha, Southern Nigeria, was recorded in *Kew Bulletin*, 1906, p. 224, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

Presentations by Mrs. Cooke.—Mrs. Cooke has very kindly presented to Kew the bronzed terra-cotta model of the bust of the late Dr. Theodore Cooke which was made by the sculptor preparatory to the execution of the marble bust presented to the College of Science, Poona. The model was taken from life about fifteen years ago. Mrs. Cooke has also presented a selection of books from Dr. Cooke's library, among which may be mentioned, T. Moore's "British Ferns and their Allies," 1866, and "Vernacular names of Plants in the Presidency Proper, Bombay," 1901, by W. P. Symonds, which were not represented in the Kew Library. Two books of Indian and Queensland Ferns, also received from Mrs. Cooke to be dealt with at the discretion of the Director, have been presented to the Botanical Department of the East London College, Mile End Road.

Hooker's Icones Plantarum.—Three parts of this work have appeared since the last notice in the *Bulletin*. Part 4 of Volume xxix., including plates 2876–2900, was issued in June 1909. Plates 2876, 2877, represent *Manihot dichotoma*, Ule, the Jequié Maniçoba of Brazil, which is said to be one of the best rubber-yielding species of the genus. The remainder of the part is devoted to the genus *Sapium*, and includes numerous new or little-known species, among which are *S. Hippomane*, G. F. W. Meyer, and *S. utile*, Preuss, both of which yield rubber.

Part 1 of Volume xxx. was issued in January 1910. It is wholly devoted to the illustration of Asiatic species of *Impatiens*, described by Sir J. D. Hooker. Eight of the species figured are from Indo-China, six from the Western Himalaya, five from the Nilgiri Hills, three from China, and one each from Afghanistan and Nepal. Fourteen of the 25 species are described for the first time.

Part 2 of Volume xxx. appeared in January 1911. Eighteen of the plates illustrate new or recently described genera.

Gooringia, t. 2944, Caryophyllaceae, tribe Alsineae, differs from *Arenaria* by its tetramerous flowers and from *Buffonia* by the 4-valved capsule. *G. Littledalei*, F. N. Williams, has the habit of a *Sagina*. It is a native of Tibet and Sikkim.

Kolkwitzia, t. 2937, is a genus of Caprifoliaceae, tribe Caprifoliaceae, allied to *Abelia*. *K. amabilis*, Graebn., was introduced into England from Hupeh, Central China, by Mr. E. H. Wilson, who found it on cliffs in the Fang District, at 10,000 ft.

Plates 2939-2942 represent four monotypic South African genera of Ericaceae, originally described in the Flora Capensis. *Eremiopsis* differs from *Eremia* in its 1-celled, 1-ovuled ovary, and from all other South African heaths in the style, which is recurved at the base, then erect and incurved at the apex. *Leptericia* is near *Coccosperma*, from which it may be distinguished by the 1-ovuled ovary and eight stamens. The very numerous suberect parallel branchlets give it a peculiar habit. *Platycalyx* differs from *Erica* in having a gamosepalous calyx and ovules solitary in each cell. *Aniserica* is allied to *Sympieza* from which it differs in its campanulate, equally 4-lobed calyx.

Vellosiella, t. 2943, is a monotypic genus now placed in Scrophulariaceae, tribe Gerardieae, next *Melasma*. The spathaceous calyx distinguishes it from all other genera of Scrophulariaceae and together with the form of the corolla has the facies of Bignoniaceae, to which family it was formerly referred. *V. dracocephaloïdes* is a subscandent herb confined to the mountains of Brazil and British Guiana.

Acrymia is a monotypic genus of Labiatae, tribe Ajugoideae, allied to *Cymaria*, from which it may be distinguished by the 2-lobed upper lip which does not conceal the 1-celled anthers. *A. ajugiflora*, Prain, t. 2946, is a native of Perak, Malay Peninsula.

Titanotrichum, Solereder, t. 2936, is a genus of Gesneriaceae, tribe Didymocarpeae, which was described almost simultaneously by Hemsley under the name *Matsumuria*. It is founded on *Rehmannia*? *Oldhamii*, Hemsl., a native of Formosa.

Hypodaphnis, t. 2938, Lauraceae, tribe Perseeae, is allied to *Nectandra*, from which it differs in the presence of distinct filaments and the inferior ovary as well as in the position of the anther-locelli. *H. Zenkeri*, Stapf, is a native of the Cameroons.

Teonongia tonkinensis, Stapf, t. 2947, Moraceae, tribe Strebleae, is the rubber-tree of Tonkin. It was at first considered a species of *Streblus* and was afterwards described as a *Bleekrodia*. *Teonongia* differs from *Streblus* in the dehiscent fruit and the equal semiglobose cotyledons and from *Bleekrodia* in the perianth of the female flower.

Aristogeitonia, t. 2926, Euphorbiaceae, tribe Phyllanthaeae, differs from the other genera of the tribe which have digitately compound leaves in the inflorescence and in having a biseriate perianth in the flowers of both sexes. *A. limoniifolia*, Prain, is a native of Loanda, Angola. *Protomegabaria*, t. 2929, belongs to the same tribe, its affinities being with *Thecacoris* and *Maesobotrya*. Two species are known, both natives of West Tropical Africa.

Neodregea, t. 2931, Liliaceae, tribe Anguillariceae, is a monotypic genus allied to *Dipidax*, Laws. *N. Glassii*, C. H. Wright, has the habit of a dwarf *Ornithoglossum*, the flower (except the ovary) of *Androcymbium*, and the ovary of *Veratrum*. It is a native of Cape Colony.

Hancockia, t. 2945, is a monotypic genus of Orchidaceae, tribe Epidendreae, differing from *Nephelaphyllum* in its short 1-flowered scapes, subconnivent sepals and petals, and long slender spur. *H. uniflora*, Rolfe, was collected in mountain forests of Mengtze, Yunnan, by Mr. W. Hancock.

Heteranthoecia, t. 2927, Gramineae, tribe Paniceae, is intermediate between *Isachne* and *Coelachne*. *H. isachnoides*, Stapf, has been collected in Nupe and in the Snussi Country, French Congo. *Lintonia*, t. 2949, Gramineae, tribe Aveneae, is allied to the Australian genus *Astrebla*. *L. nutans*, Stapf, is known only from Nairobi, British East Africa. *Dignathia*, t. 2950, Gramineae, tribe Zoysieae, consists of two species, natives of British East Africa. It is allied to *Latipes*, Kunth.

Among the other plants figured are the following :—

Xylia Kerrii, Craib et Hutchinson, t. 2932, Leguminosae, tribe Adenanthereae, a native of Siam and Burma.

Brachylaena Hutchinsii, Hutchinson, t. 2928, Compositae, tribe Inuloideae, a native of British East Africa. It is a tree attaining a height of 90–100 ft., and yields a durable timber, which is not subject to the ravages of white ants.

Arrabidaea crassa, Sprague, t. 2933, Bignoniaceae, tribe Bignonieae, a very distinct species remarkable for its exserted stamens and acutely angled, almost winged capsule.

Ocotea usumbarensis, Engl., t. 2934, Lauraceae, tribe Perseeae, a very valuable timber tree, native of Tropical East Africa.

Tylostemon ugandensis, Stapf, t. 2943, a native of Uganda, belongs to the same tribe.

Phyllanthodendron roseum, Craib et Hutchinson, t. 2935, Euphorbiaceae, tribe Phyllanthaeae, a native of Siam.

Arundinaria tessellata, Munro, t. 2930, the South African Bamboo, of which flowering specimens have only recently been collected.

“Die-Back” of Cacao and of Para Rubber.—*Diplodia cacaoicola*, P. Henn., was first observed on cacao wood from the Cameroons in 1896. Since that date the fungus has proved a veritable scourge in cacao plantations, in localities as far distant from each other as the West Indies, St. Thome, Federated Malay States, Phillippines, &c.

The form-genus *Diplodia* contains many injurious parasites, and in only a few instances the higher or ascigerous condition of the fungus is known. An attempt to solve the life-history of *D. cacaoicola*, was undertaken by Mr. Keith Bancroft, in the Jodrell Laboratory, at Kew, from material received from West Africa, teeming with the *Diplodia*, which has resulted in demonstrating that the *Diplodia* is followed in due course, on dead material, by an ascigerous condition of the fungus, which proves to belong to the genus *Thyridaria*. The species is new and has been described as *T. tarda*, Bancroft.

Further observations have proved that *Thyridaria tarda* is the cause of the “die-back” disease of the cacao plant and of the

“brown-rot” of cacao pods and that its *Diplodia* form is identical with that of the fungus which is the cause of the ‘die-back’ disease of Para rubber in the Straits Settlements and Federated Malay States. It appears therefore highly probable that both diseases are primarily due to *Thyridaria tarda*.

A preliminary account of this fungus with a description and elucidation of the synonymy is given in the Agricultural Bulletin of the Straits and Federated Malay States, ix. (1910), pp. 475-478. A note was also published in the *Kew Bulletin*, 1910, pp. 93-95.

G. M.

Dacrydium cupressinum.—This tree, a native of New Zealand, where it is widely distributed, yields the wood known commercially as Rimu. From a correspondent of Kew we learn that Rimu varies very greatly in quality and texture according to the nature of the locality in which the tree grows. Thus in the northern part of North Island the tree while attaining a large size yields a timber, particularly when it grows in swampy ground, which is poor in colour and of coarse and open texture. The best quality is what is known locally as ‘Mountain Rimu,’ from trees grown at about, or over, 1000 ft. above sea-level, and in soil of a suitable character. Such trees are stated to be about 3 ft. in diameter and as a rule have a clean trunk of about 40 ft. In estimating the amount of ‘prime wood’ in such a tree the portion beyond the point where branching begins is said not to be considered.

Prime Mountain Rimu is stated to be sold in the London market at somewhere about 30s. per 100 ft. super net, but the price is understood to vary somewhat according to the demand.

The Queen Victoria Niagara Falls Park System.—The following account of the Park system in process of formation at Niagara Falls in the Dominion of Canada is part of an interesting communication received from Mr. H. J. MOORE, Chief Gardener, formerly a member of the gardening staff at Kew. The scheme outlined promises to provide the Dominion of Canada with a most important botanical collection of trees, shrubs, and hardy plants, as well as a park system of remarkable beauty, unique in the grandeur of its surroundings:—

Many people who have visited the Falls of Niagara associate the name with the cataract only. The district, however, has other claims to fame. In the Niagara peninsula is to be found one of the finest fruit-producing countries in the world. Fruits from this district bring the highest prices, the quality of the peaches, apples and grapes (outdoor) being unsurpassed. The Niagara district also furnishes much of historical interest, for here were fought some of the bloodiest battles of the fierce conflict of 1812 which has had such an effect upon present day administration along both sides of the Niagara frontier.

On the Canadian side of the Niagara River extending about 26 miles between the villages of Queenston and Bridgeburg is a strip

of land which the Provincial Government of Ontario very wisely purchased and set aside as a national park, the total area of which is just over 800 acres. At one end of this reserve, near Lake Ontario, is the battlefield of Queenston Heights; and at the other end the battlefield of Fort Erie. The city of Niagara Falls, Ontario, is about midway between these two points, and here the Queen Victoria Park Commissioners are doing a splendid work in developing a park system which will undoubtedly rank with the best in the world, both from an aesthetic and an educational standpoint.

Perhaps the most important project the Parks Commission have in hand is the construction of a boulevard extending from a point near the Falls to Bridgeburg 16 miles up the river. I need not enter into details of its construction; suffice it to say that each mile section along its course will be planted with one variety of shade tree, while at several points, where the width is sufficient, small parks will be formed. Along such sections of the boulevard as are somewhat removed from the river, avenues of trees will be planted, but where the river runs parallel with it the trees and shrubs will be grouped in such a manner that they will not obstruct the general view of the river, which is, in many places, over a mile in width.

The park system will undoubtedly be very attractive, enhanced as it is by the beauty of its environment. The proximity of large Canadian and American cities, such as St. Catharines, Niagara Falls and Buffalo, renders its construction essential and in time it will no doubt rank with the best American park systems in point of utility as well as beauty.

The area in the vicinity of the Falls, amounting to two hundred acres, is being transformed and laid out more or less in the nature of a large botanical garden. The southerly portion will form the arboretum. A large range of iron-frame greenhouses and conservatories will be built to accommodate various exotic species and varieties of plants, also to furnish a sufficient space to display the decorative or greenhouse types, such as *Chrysanthemums*, *Cyclamens*, *Primulas*, &c., in their respective seasons.

The northerly portion, in which are situated the herbaceous borders and flower beds, also contains the baseball, football and cricket grounds, the tennis courts and bowling greens. In this area many beautiful and valuable specimen trees and shrubs are planted.

Coniferae are strongly represented and flourish well under the conditions at the Falls. *Thuja occidentalis*, *Juniperus virginiana*, *Tsuga canadensis*, *Pinus Strobus* and *Taxus canadensis* grow naturally at various points in the park proper and are also to be found in abundance along the lower Niagara Gorge.

Evergreens other than conifers are rare, very few of the broad-leaved type have up to the present proved hardy enough to stand the rigours of the severe Canadian winters, therefore this class of plants is only represented by such subjects as *Rhododendron catawbiense*, *R. maximum*, and *Kalmia latifolia*.

There are many remarkable specimens of deciduous trees, some of which are growing naturally, while others, perhaps the majority, have been planted. Splendid specimens of *Ulmus americana*,

Aesculus Hippocastanum and *Fraxinus americana* are to be seen at every turn; *Juglans nigra*, the Black Walnut, is fairly common and attains a great height, many specimens in the Park are at least 80 feet high.

Catalpa Bungei, *C. speciosa*, *C. bignonioides*, *Liriodendron Tulipifera*, *Quercus coccinea*, *Q. palustris*, *Q. rubra*, *Tilia europaea*, and *T. americana* are also included among our arboreal specimens. Of the genus *Fagus* we have three species, namely, *F. ferruginea*, *F. sylvatica* and its variety *purpurea*.

Nowhere do hardy shrubs flourish better than at Niagara Falls, the spray conditions being such that plant life very rarely suffers from drought, consequently the shrubs are healthy and vigorous, although in the past they have suffered somewhat through lack of proper pruning and thinning; the same is also true of the trees.

Berberis Thunbergii, *B. vulgaris*, *B. Aquifolium* and *B. canadensis* thrive splendidly. Cornus of many species, Forsythias, Ligustrums, Hydrangeas, Loniceras, Deutzias, including both single and double flowering kinds, such as *D. crenata*, *D. Lemoinei*, *D. candidissima*, *D. gracilis*, and *D. scabra* also flourish. There are in addition a few varieties of the above species.

The herbaceous garden has during the past been arranged in the form of a huge border, but steps are being taken to arrange the whole collection botanically after the Kew method. Space forbids a detailed account of the species and varieties of herbaceous plants, but from the fact that the garden covers one acre of ground, the number of plants may be approximately estimated. Lilliums, Phlox and perennial Asters flower profusely, each in their respective seasons affording a beautiful sight to the thousands of visitors who annually visit the Park.

The proposed arboretum in the southerly portion of the park will be so designed that the trees and shrubs can be planted botanically in groups for educational purposes. There will be a pinetum, an ericaceous garden containing a *Rhododendron* glen and a collection of lilacs amongst other features. I mention these simply to give the idea of what is contemplated. All trees and shrubs indigenous to temperate North America and especially to Canada will be planted in this area, while acclimatized exotic subjects will also be included in the collection.

A better location for an arboretum would be hard to find; on the west the area is flanked by an escarpment 100 feet high covered with beautiful hardwood trees interspersed with a few pines. It is sheltered from violent storms from that quarter, also in some degree from the north, as the escarpment bends round and covers a distance of two and three-quarter miles. At the most southerly point are situated the beautiful Dufferin Islands. The Niagara River borders the entire park system on its eastern side. In both the old and newer portions of the park system the trees and shrubs will be named after the method in vogue in Kew, lead labels being used. One of the objects of the Park Commission is to develop the park system along educational lines, and the Commission and their Superintendent, Mr. John H. Jackson, have entered upon the work in the right spirit. What the Ontario Agricultural College is to the Province in agriculture, so will the Queen Victoria Park be to

the Province and to the Dominion of Canada in horticulture and botany. In landscape beauty the park system will undoubtedly rank amongst the best of its kind, for glorious natural features abound on every hand.

There are four power generating stations in the park, the Toronto Power Company's, the Canadian Niagara Power Company's, the International Railroad Company's, and the Ontario Power Company's. The Toronto Power Company's generating station is a magnificent structure, and although it is not quite completed it has the appearance of a beautiful library or museum. In the immediate foreground are beds sunk in concrete, the whole being arranged in the form of a terrace approached by steps. In these beds are usually planted sub-tropical and ordinary bedding planting plants in spring, and in the autumn bulbous plants such as Tulips, Hyacinths, and Narcissus.

The Administration Building contains the offices of the Parks Commission and of the Superintendent and his staff; the basement is divided into lavatories and Constables' headquarters. The second floor serves as a restaurant, while the Board room of the Commission and their bedrooms are on the top or third floor. These rooms are only used when the Board is in session. Standing as it does in proximity to both the American and Canadian Falls the building has a very desirable location and from its balconies splendid views can be obtained.

The Office Staff of the park is composed of the Superintendent and his Assistant, a Landscape Gardener, an Assistant Engineer and two Draughtsmen, an Accountant and Assistant Stenographer. The number of men employed in the park proper is about 80 in summer, this number being reduced to probably 20 in winter; the greenhouse staff of four men is permanent. The total number of men employed in the entire park system, including the outlying parks and boulevard is approximately 120. This number of necessity must be greatly increased as the boulevard is extended.

There are only four trained gardeners employed by the Parks Commission, two of them Kew men. I have met many gardeners from Britain, and am glad to say that in nearly every case the best positions are held by old Kewites. I may state that the mere fact of having taken the Kew course places a man in the front rank of horticulturists out here. Let me say that nowhere else is it possible for a gardener to obtain such a training as Kew affords. This fact strikes home to many a Kewite, when Kew to him is a thing of the past.

As an old Kewite I would advise the young fellows in Kew to make the best of their time, not only as far as practical work is concerned, but also in the various courses of lectures. Two years is a very short period, they should, therefore, crowd all they possibly can into them. The opportunity will never come again, and when they leave they should remember it is their duty wherever they may be to uphold the reputation of Kew. By so doing the chances of their fellow Kewites are materially improved.

Botanical Magazine for February.—The plants figured are *Meliosma cuneifolia*, Franch. (t. 8357); *Kennedya Beckxiana*, F. v. Muell. (t. 8358); *Urceocharis edentata*, C. H. Wright (t. 8359); *Prunus microcarpa*, C. A. Mey. (t. 8360); and *Masdevallia pachyura*, Reichb. f. (t. 8361).

The *Meliosma* is a Chinese plant found in Szechuan, Hupeh and Yunnan. The specimen figured was raised from seeds collected on Mount Omi and sent to Messrs. J. Veitch and Sons by Mr. E. H. Wilson. This genus is the only one of its order, *Sabiaceae*, which can be grown in the open in Great Britain. With its many-flowered, pyramidal panicles of small, greenish-yellow flowers it forms an interesting addition to our collections of ornamental shrubs. *Kennedya Beckxiana* is a striking greenhouse twining plant from New South Wales and was raised at Kew from seed purchased from Mr. J. Staer, Wahroonga, New South Wales, in 1908. The flowers are a good red with a greenish-yellow patch at the base of the standard and are larger than those of any other *Kennedya* in cultivation. The *Urceocharis* which forms the subject of the next plate appears to be a natural hybrid between *Urceolina pendula* and *Eucharis grandiflora* and is very similar to the hybrid *Urceocharis Clibrani*, Mast., raised by Messrs. Clibran and described in 1892. The plant figured was collected in Peru by Mr. Forget and was purchased from Messrs. Sander and Sons, St. Albans. It flowered at Kew in a moist tropical house in July, 1909. The delicate little Cherry, *Prunus microcarpa*, was acquired for Kew from Zoeschen in 1900 and is a native of the near East. The species is a variable one as regards habit and tomentum, the form depicted resembles most closely *Cerasus tortuosa*, Boiss. & Hausskn. Under cultivation it requires a sunny situation and though it flowers freely in May it seldom sets fruits in this country. The *Masdevallia* is a member of the small group *Amandae* with racemose flowers and comes from Ecuador where it was discovered by Roezl. It was described as long ago as 1874. Mr. Consul Lehmann introduced the plant to cultivation having sent plants to Mr. J. O'Brien, with whom it flowered in 1897. In its native country it is found at from 5600–8300 feet above sea level in damp thick woods on trees or occasionally on rocks.

Lagos Silk Rubber Tree (*Funtumia elastica*).—This species which is under experimental cultivation in many tropical countries, is indigenous both to East and West Tropical Africa. In these regions it is widely exploited for rubber which, when carefully prepared, finds a ready market and commands a high price.

The Provincial Forest Officer, Western Province, Southern Nigeria has conducted a series of experiments both in tapping and coagulating the latex of this tree; the following observations upon the results obtained being gathered from the "Annual Report on the Forestry and Agricultural Departments for the year 1909," p. 7, published at Lagos in 1910.

"There are two ways of tapping this tree for latex, namely the excision and the incision systems.

"By the excision method deep cuts as far as the cambium are made, while by the incision system only shallow channels are opened, just deep enough to allow the latex to run down the tree; incisions are then made into these channels by means of a pricker.

"Of the incision tapping, the most satisfactory results, so far as the quantity of latex is concerned, were obtained from the spiral system; this gave in comparison with the total length of cuts the highest yields of latex.

"Taking it all round however the experiments carried out with the excision method have been very disappointing. Trees tapped last year for the first time, and tapped on the same area this year gave only one-tenth of the amount of latex yielded last year. This shows that a tree has to be given many years' rest after one tapping before it can be profitably tapped again.

"There seems to me but little doubt left that the incision tapping by means of a pricker is the right method for *Funtumia* trees, as there is comparatively little damage done to the plant and, as Dr. Christy of Uganda assured us, a tree can be tapped three times a year without showing a decrease in yield.

"Experiments were also made in connection with the preparation of *Funtumia* rubber.

"Of the cold methods, *i.e.*, coagulation without boiling the latex—purub and acetic had no effect on the *Funtumia* latex. Good biscuits can be prepared by adding formalin or absolute alcohol to the latter. But there is no reason why the native should use expensive chemicals for the preparation of his rubber, as good thin biscuits can just as well be made by simply boiling the latex and then washing and pressing it, the principal thing being to boil as small a quantity of latex as possible at a time, so as to ensure the preparation of very thin biscuits. The latter are then easily dried."

Notes on *F. elastica* will be found in the *Kew Bulletin*, 1905, p. 56; 1907, pp. 187 and 249; 1909, p. 147 and 1910, p. 206.

Forestry among the Chinese.—It is curious to turn from the deliberately business-like method with which a European nation attacks the question of afforestation to the slow and irregular beginnings of the idea of forestry in the Oriental mind. To the Chinese the very notion of the conservation of forest, or of the afforestation of denuded ground, is foreign. The Mandarins and petty officials, though, no doubt, excellent guardians of the peace, do not make it their business to plan public works for the benefit of the communities over which they preside, and there is not enough co-operation among the people themselves to enable them to organise on their own account any extended scheme, such as would be required for an effective commencement of forestry. In order to understand the peculiar indifference, or almost resistance, to the idea of forestry which is found in South China, it is necessary to remember that the present inhabitants, originating from the north, and penetrating in past ages little by little into the virgin forests which then covered the mountains before them, came to regard it as a virtue to clear from the ground the trees which afforded

shelter to the wild beasts, and at the same time impeded their agriculture. As large cities began to spring up it was natural, moreover, that, along the river valleys and other places whence timber and fuel could be cheaply transported to them, a regular system of exploiting this produce should become prevalent. At the present time, in districts like the one near Hong Kong, with which the writer is well acquainted, the process of exploitation has been succeeded by one of absolute denudation. The cutting of the trees for timber has been followed by long-continued clearing of the secondary undergrowth, and as scrub, however tenacious, will not survive many centuries of constant cropping, many of the mountain sides have become quite bare of all kinds of vegetation except an irregular growth of coarse grass.

It is in this sort of country, where cultivated ground is scarce, and steep mountain ranges abundant, where the streams are drying up year by year, as their valleys lose their verdure, and where the supply of fuel is far below the demand, that the first efforts towards forestry are becoming apparent. In many parts of China the country folk are still divided more or less distinctly into two races, often with their separate villages, and with their different dialects—one representing the older and less-civilised population, which had become dominated by a more highly cultured invading race, and had been driven by them into the mountains and other unfavourable tracts of country. It is among the older and wilder portion that the remains of woodcraft is found, and it is naturally among them that interest in re-afforestation becomes first apparent. In Kwantung Province, while the more civilised agricultural population, sometimes called Punti, confine their attention to the rich alluvial tracts along the sea-shore and in the larger valleys, the wild hill men or Hakka people get what living they can by cultivating the small mountain valleys and the more fertile slopes around them. It is these latter who have made the most general practice of forming plantations, mostly of pine trees, on the hills round their villages; but they have not developed a sound principle of forestry, and therefore obtain only a scanty return for the labour expended upon it. It is indeed quite a rare thing to see any trees planted by the Chinese permitted to attain their proper development for market purposes.

It is interesting to see the effect of the introduction of western scientific methods of forestry among a population which has already arrived at the stage above indicated. The Chinese are extremely loth to adopt any method which is strikingly different to that employed by their ancestors before them, and it is only very gradually that any attempted improvement of their operations finds favour among them. It is in fact only when direct and obvious advantages are observed by them to follow a new plan that they take any interest in it at all. The inhabitants of the district, some six hundred square miles in extent, which has come under the control of the British government of Hong Kong, have for the last thirty years had an opportunity of seeing the effect of re-afforestation on sound modern principles. A large number of them have actually been employed by the British forestry department, and others are having the advantages of forestry brought before their notice in the

native schools throughout the territory, and at the present time there are certainly signs of an awakening to an aspect of forestry which is entirely new to them. They are beginning to appreciate the advantages which accrue to the whole neighbourhood from the systematic planting of the bare hills. The plantations established by the Chinese are more extended, and better tended than they were ten years ago. Enquiries from Chinese authorities in various parts of South China have moreover been received in Hong Kong as to the best means of obtaining instruction in forestry for their people and as regards the best species to plant, and the best way of managing them. It does not require much consideration to appreciate the vast importance to the Chinese nation of these preliminary movements towards the re-afforestation of their bare hills. There are few places in the world where good coniferous timber will grow more easily or more quickly than in certain parts of South China, and it might very easily not only supply its own needs of timber and fuel, but even replace its timber import trade by a flourishing output of valuable soft and hard woods into the neighbouring commercial centres of the Southern Pacific.

S. T. D.

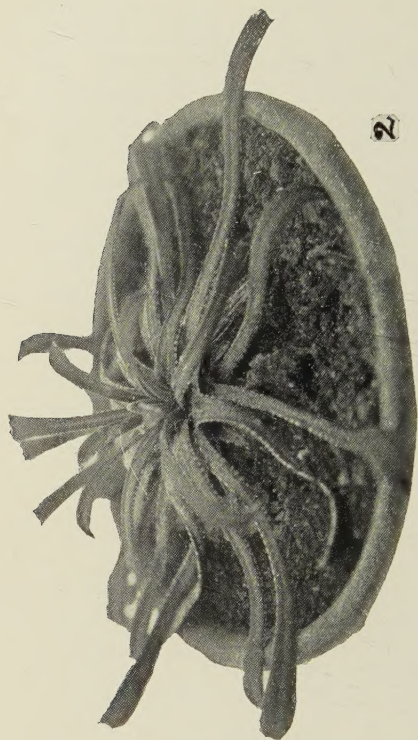
The Broad Stone of Empire.*—In this important and interesting work, Sir Charles Bruce deals with the problems of Crown Colony administration, and gives an exhaustive survey of our policy, National, Colonial and Imperial, and of all the factors concerned with the development of the dominions of the British Empire. To review so comprehensive a book is beside our functions, though from the close association of Kew with the Colonies the numerous botanical and agricultural problems referred to in the earlier pages deserve more than passing notice.

Chapters xviii. and xix., dealing respectively with Agriculture and Forestry, concern Kew more nearly, since, as Sir Charles points out, "The gardens have, in fact, for 150 years been the botanical headquarters of the Empire."

The development of the organised agricultural system in the West Indies is described in detail and, as with most of the problems dealt with in the book, the author has been able to bring his great personal experience to illustrate his review of the course of events. The wisdom of the establishment of Botanic Stations and Gardens, of Agricultural organisation and of definite systems of forest preservation is ably demonstrated. In the records placed before us there are on all sides sad stories of neglect, indifference and reckless waste, but there is also the history of the gradual ascendancy of wiser councils and of the adoption of more definite lines of policy, some of which, and by no means the least important, as the printed records show, have emanated from Kew.

The book should be carefully studied by all who are interested in the rise and progress of our colonial administration.

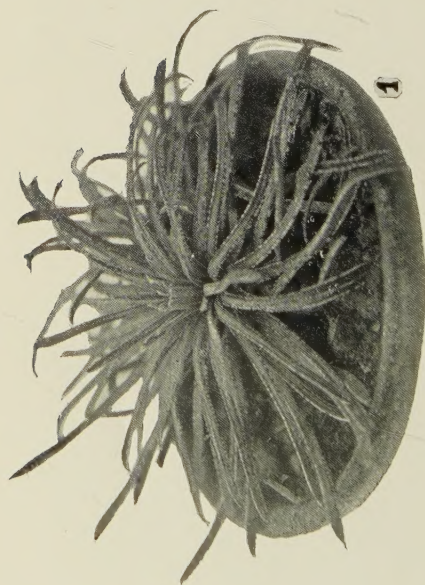
* *The Broad Stone of Empire. Problems of Crown Colony Administration with records of personal experience, by Sir Charles Bruce, G.C.M.G., with Maps* 2 vols. Macmillan & Co., Ltd., London, 1910.



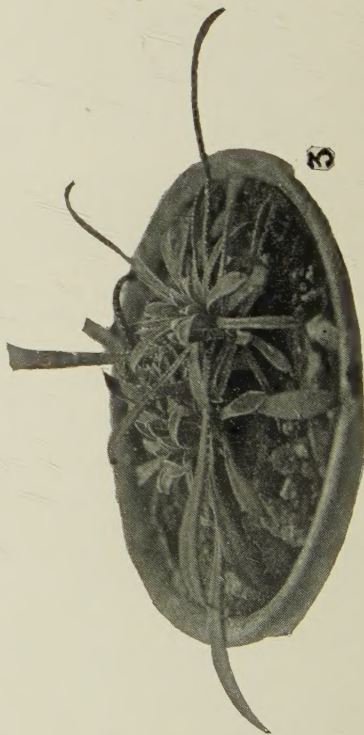
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